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UNITED STATES DISTRICT COURT  
WESTERN DISTRICT OF WASHINGTON  
AT SEATTLE

INTERNATIONAL BUSINESS MACHINES  
CORPORATION,

Plaintiff,

v.

ZILLOW GROUP, INC., and ZILLOW, INC.,

Defendants.

Case No.: 2:20-cv-00851-TSZ

SECOND AMENDED COMPLAINT FOR  
PATENT INFRINGEMENT

JURY TRIAL DEMANDED

SECOND AMENDED COMPLAINT FOR PATENT  
INFRINGEMENT  
Case No. 2:20-cv-00851-TSZ

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**SECOND AMENDED COMPLAINT FOR PATENT INFRINGEMENT**

Plaintiff International Business Machines Corporation (“IBM”), for its Second Amended Complaint for Patent Infringement against Zillow Group, Inc. (“Zillow Group”) and Zillow, Inc. (collectively “Defendants” or “Zillow”), alleges as follows:

## **JURISDICTION AND VENUE**

1. This action arises under 35 U.S.C. § 271 for Defendants' infringement of IBM's United States Patent Nos. 7,072,849 (the "849 patent"), 7,076,443 (the "443 patent"), 7,187,389 (the "389 patent"), 7,631,346 (the "346 patent"), 8,315,904 (the "904 patent"), 9,158,789 (the "789 patent"), and 9,245,183 (the "183 patent") (collectively, the "Patents-in-Suit").

2. This action arises under the patent laws of the United States, including 35 U.S.C. § 271 *et seq.* The jurisdiction of this Court over the subject matter of this action is proper under 28 U.S.C. §§ 1331 and 1338(a).

3. This Court has personal jurisdiction over Zillow Group and Zillow, Inc. because, among other things: Zillow Group and Zillow, Inc. have a regular and established place of business in this judicial district; Zillow Group and Zillow, Inc. have committed, aided, abetted, contributed to and/or participated in the commission of acts giving rise to this action within the State of California and this judicial district and have established minimum contacts within the forum such that the exercise of jurisdiction over Zillow Group and Zillow, Inc. would not offend traditional notions of fair play and substantial justice; Zillow Group and Zillow, Inc. have placed products and services that practice the claims of the Patents-in-Suit into the stream of commerce with the reasonable expectation and/or knowledge that actual or potential users of such products and/or services were located within this judicial district; and Zillow Group and Zillow, Inc. have sold, advertised, solicited customers, marketed and distributed their services that practice the claims of the Patents-in-Suit in this judicial district.

1       4.     Venue is proper in this Court pursuant to 28 U.S.C. §§ 1391(b) and (c) and 1400(b),  
2 at least because Zillow Group and Zillow, Inc. each have a regular and established place of business  
3 in this judicial district and both Zillow Group and Zillow, Inc. have committed, and continue to  
4 commit, acts of infringement in this judicial district.

## **INTRODUCTION**

6 5. IBM is a world leader in technology and innovation. IBM spends billions of dollars  
7 each year on research and development, and those efforts have resulted in the issuance of more than  
8 110,000 patents worldwide. Patents enjoy the same fundamental protections as real property. IBM,  
9 like any property owner, is entitled to insist that others respect its property and to demand payment  
10 from those who take it for their own use. Defendants have built their business model on the use of  
11 IBM's patents. Moreover, despite IBM's repeated attempts to reach a business resolution,  
12 Defendants refuse to negotiate a license to IBM's patent portfolio. This lawsuit seeks to stop  
13 Defendants from continuing to use IBM's intellectual property without authorization.

## **THE PARTIES**

15       6. Plaintiff IBM is a New York corporation, with its principal place of business at 1  
16 New Orchard Road, Armonk, New York 10504.

17       7.     Defendant Zillow Group is a Washington corporation with a principal place of  
18 business at 1301 Second Avenue, Floor 31, Seattle, Washington. Zillow Group may be served with  
19 process at its registered agent C T Corporation System, 818 West Seventh Street, Suite 930, Los  
20 Angeles, California 90017.

21 8. Zillow Group “operates the largest portfolio of real estate and home-related brands  
22 on mobile and the web which focus on all stages of the home lifecycle: renting, buying, selling and  
23 financing.”<sup>1</sup> Zillow Group provides a “comprehensive suite of marketing software and technology  
24 solutions to help real estate, rental, and mortgage professionals maximize business opportunities and

<sup>1</sup> Ex. 4 (Zillow Group 2018 10-K) at 3.

1 connect with millions of consumers.”<sup>2</sup> Zillow Group generates revenue at least based on the “sale  
 2 of advertising under [its] Premier Agent and Premier Broker programs.”<sup>3</sup> Zillow Group’s portfolio  
 3 of real estate and home-related brands includes Zillow. Zillow Group owns and completely controls  
 4 Zillow, Inc.

5       9.      Defendant Zillow, Inc. is a Washington corporation with a principal place of business  
 6 at 1301 Second Avenue, Floor 31, Seattle, Washington. Zillow, Inc. may be served with process at  
 7 its registered agent C T Corporation System, 818 West Seventh Street, Suite 930, Los Angeles,  
 8 California 90017. Zillow, Inc. also operates the Zillow website, including at least [www.zillow.com](http://www.zillow.com),  
 9 [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the Zillow mobile applications,  
 10 including at least the iOS and Android Zillow Real Estate & Rentals, Zillow Rentals, and Zillow  
 11 Premier Agent applications. Zillow, Inc. provides online real estate listings and related services to  
 12 consumers and local real estate agents through Zillow’s website and through the Zillow mobile  
 13 applications.

14       10.     Zillow operates “Zillow Offers,” “which allows homeowners to [] sell their home  
 15 directly to Zillow . . . [and then Zillow] makes certain repairs and updates, and then lists it for sale  
 16 on the open market.”<sup>4</sup> .

## 17                   FACTUAL BACKGROUND

### 18       A.      **IBM Is A Recognized Innovator.**

19       11.     IBM is recognized throughout the world as a pioneer in many aspects of science and  
 20 technology. On eight occasions, more times than any other company or organization, IBM has been  
 21 awarded the U.S. National Medal of Technology, the nation’s highest award for technological  
 22 innovation. During IBM’s over-100-year history, IBM’s employees have included six Nobel  
 23

24       <sup>2</sup> *Id.*

25       <sup>3</sup> *Id.*

<sup>4</sup> *Id.* at 10.

1 laureates, six Turing awards, five National Medal of Science recipients, and at least twenty-five  
 2 inventors in the National Inventors Hall of Fame.

3       12. These and other IBM employees have introduced the world to technology that the  
 4 global community takes for granted today, including the dynamic random access memory—  
 5 DRAMs—found in nearly all modern computers; magnetic disk storage—hard disk drives—found  
 6 in computers and portable music players; and some of the world’s most powerful supercomputers,  
 7 including Deep Blue, the first computer to beat a reigning chess champion and which is on display  
 8 at the Smithsonian’s National Museum of American History in Washington, D.C. IBM’s  
 9 commitment to developing these types of advanced computing technologies has helped to usher in  
 10 the information age.

11 **B. IBM Is Committed To Protecting Its Innovations Through The Patent System.**

12       13. IBM’s research and development operations differentiate IBM from many other  
 13 companies. IBM annually spends billions of dollars on research and development, yielding  
 14 inventions that have literally changed the way the world works. For over two decades the United  
 15 States Patent and Trademark Office (“USPTO”) has issued more patents to IBM than to any other  
 16 company in the world.

17       14. Like the research upon which the patents are based, IBM’s patents also benefit  
 18 society. Indeed, the Supreme Court has recognized that the patent system encourages both the  
 19 creation and the disclosure of new and useful advances in technology. Such disclosure, in turn,  
 20 permits society to innovate further. And, as the Court has further recognized, as a reward for  
 21 committing resources to innovation and for disclosing that innovation, the patent system provides  
 22 patent owners with the exclusive right to prevent others from practicing the claimed invention for a  
 23 limited period of time.

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1           **C. IBM Routinely Licenses Its Patents In Many Fields But Will Enforce Its Rights**  
 2           **Against Those Who Use Its Intellectual Property Unlawfully.**

3           15. IBM's commitment to creating a large patent portfolio underscores the value that  
 4 IBM places in the exchange of innovation, and disclosure of that innovation, in return for limited  
 5 exclusivity. Indeed, IBM has used its patent portfolio to generate revenue and other significant value  
 6 for the company by executing patent cross-license agreements. The revenue generated through  
 7 patent licensing enables IBM to continue to commit resources to innovation. Cross licensing, in  
 8 turn, provides IBM with the freedom to innovate and operate in a manner that respects the technology  
 of others.

9           16. Given the investment IBM makes in the development of new technologies and the  
 10 management of its patent portfolio, IBM and its shareholders expect companies to act responsibly  
 11 with respect to IBM's patents. IBM facilitates this by routinely licensing its patents in many fields  
 12 and by working with companies that wish to use IBM's technology in those fields in which IBM  
 13 grants licenses. When a company appropriates IBM's intellectual property but refuses to negotiate  
 14 a license, IBM has no choice but to seek judicial assistance.

15           **D. IBM Invented Methods For Presenting Applications And Advertisements In An**  
 16           **Interactive Service While Developing The PRODIGY Online Service.**

17           17. The inventors of the '849 patent developed the patented technologies as part of IBM's  
 18 efforts to launch the PRODIGY online service ("Prodigy"), a forerunner to today's Internet, in the  
 19 late 1980s. The inventors believed that to be commercially viable, Prodigy would have to provide  
 20 interactive applications to millions of users with minimal response times. The inventors believed  
 21 that the "dumb" terminal approach that had been commonly used in conventional systems, which  
 22 heavily relied on host servers' processing and storage resources for performance, would not be  
 23 suitable. As a result, the inventors sought to develop more efficient methods of communication that  
 24 would improve the speed and functionality of interactive applications and reduce equipment capital  
 25 and operating costs.

1       18. In light of the above considerations, the inventors developed novel methods for  
 2 presenting applications and advertisements in an interactive service that would take advantage of the  
 3 computing power of each user's PC and thereby reduce demand on host servers, such as those used  
 4 by Prodigy. The inventors recognized that if applications were structured to be comprised of  
 5 "objects" of data and program code capable of being processed by a user's PC, the Prodigy system  
 6 would be more efficient than conventional systems. By harnessing the processing and storage  
 7 capabilities of the user's PC, applications could then be composed on the fly from objects stored  
 8 locally on the PC, reducing reliance on Prodigy's server and network resources.

9       19. The service that would eventually be called Prodigy embodied inventions from the  
 10 '849 patent when it launched in late 1988, before the existence of the World Wide Web. The  
 11 efficiencies derived from the use of the patented technology permitted the implementation of one of  
 12 the first graphical user interfaces for online services. The efficiencies also allowed Prodigy to  
 13 quickly grow its user base. By 1990, Prodigy had become one of the largest online service providers  
 14 with hundreds of thousands of users. Prodigy was widely praised in the industry and is still held up  
 15 as an example of innovation in computer networks that predated even the advent of the World Wide  
 16 Web. The technological innovations embodied in this patent persist to this day and are fundamental  
 17 to the efficient communication of Internet content.

18       20. Today, it is easy to take the World Wide Web, powerful computers, and high-speed  
 19 network connectivity for granted. Not so in 1988, when the first application in the '849 patent's  
 20 priority chain was filed. The World Wide Web had not even been conceived yet. Typical personal  
 21 computers at the time had "512K RAM"—not 512 megabytes or gigabytes of RAM, but 512  
 22 **kilobytes.** '849 patent at 9:16-18. The '849 patent also describes the use of 1,200 to 2,400 bps (bits  
 23 per second) modems to access a network—a far cry from today's high-speed internet. *Id.* at 9:18-  
 24 20.

25

1       21. The limited processing power and network bandwidth available in 1988 posed  
 2 significant technical obstacles to the development and adoption of network-based interactive  
 3 services, in which many users may access interactive services provided by a host. *Id.* at 1:34-58.  
 4 Accordingly, the '849 patent specifically identifies slowdowns in network response time caused by  
 5 processing bottlenecks at the host as a problem to be solved:

6       [I]n conventional time-sharing computer networks, the data and program  
 7 instructions necessary to support user sessions are maintained at a central host  
 8 computer. However, that approach has been found to create processing bottlenecks  
 9 as greater numbers of users are connected to the network; bottlenecks which require  
 10 increases in processing power and complexity; e.g., multiple hosts of greater  
 11 computing capability, if the network is to meet demand. Further, such bottlenecks  
 12 have been found to also slow response time as more users are connected to the  
 13 network and seek to have their requests for data processing answered. *Id.* at 10:42-  
 14 53; see also *id.* at 1:43-52, 10:54-57.

15       As the '849 patent also explains, simply adding additional computing capacity to the hosts is not  
 16 enough to fix the bottleneck problem. “[E]ven in the case where additional computing power is  
 17 added, and where response time is allowed to increase, ***eventually the host becomes user saturated***  
 18 as more and more users are sought to be served by the network.” *Id.* at 10:58-61. In other words,  
 19 even a host with additional computing capacity would still have limits on how many users it could  
 20 support in conventional approaches.

21       22. Conventional approaches to providing advertising in interactive services exacerbated  
 22 the bottleneck problem by clogging limited network bandwidth. In conventional approaches to  
 23 advertising in interactive services, advertising had to compete with service application data for  
 24 limited network bandwidth. *Id.* at 2:20-30. That competition between advertising and service  
 25 application data had “the undesirable effect of diminishing service response time.” *Id.* at 2:25-26.

26       23. The bottleneck problem arises from the limitations of networks that rely exclusively  
 27 on central hosts to satisfy users’ data processing requests and the limited network bandwidth  
 28

1 available at the time of the invention. Accordingly, the bottleneck problem addressed by the '849  
 2 patent is a "technical problem."

3       24. Some of the technical solutions and innovative aspects of the '849 patent are set forth  
 4 in the technology tutorial that IBM submitted in the *IBM v. Groupon* litigation. Ex. 71 at timestamp  
 5 1:37.

6       25. Before this suit, the '849 patent had been challenged three times on grounds of alleged  
 7 patent ineligible. Those challenges were all unsuccessful. In the matter of *IBM v. The Priceline*  
 8 *Grp., Inc.*, C.A. No. 1:15-cv-00137 (D. Del.), the defendants (collectively "Priceline") filed a motion  
 9 to dismiss, alleging that the '849 patent was directed to unpatentable subject matter. The Delaware  
 10 court denied Priceline's motion, finding that "Defendants have failed to meet their burden of  
 11 demonstrating that . . . claim 1 of the '849 patent [is] devoid of inventive concepts." *IBM v. The*  
 12 *Priceline Grp., Inc.*, 2016 WL 626495, at \*24 (D. Del. Feb. 16, 2016) (attached as Ex. 72.)

13       26. In the matter of *Kayak Software Corp. v. IBM.*, CBM2016-00075, Priceline again  
 14 challenged the '849 patent on alleged patent eligibility grounds, this time before the Patent Trial and  
 15 Appeal Board ("PTAB"). Just like in the district court, the PTAB rejected Priceline's challenge.  
 16 The PTAB "agree[d] with Patent Owner the disclosure of the '849 patent itself is almost exclusively  
 17 directed to solving a problem arising in computer technology (i.e., bandwidth) with a computerized  
 18 solution (i.e., local storage)." Ex. 73 (*Kayak Software Corp. v. IBM.*, CBM2016-00075, Paper 16  
 19 (PTAB Dec. 15, 2016)) at 19. The PTAB thus concluded, "Petitioner has not shown sufficiently that  
 20 independent claims 1 and 21 are directed to an unpatentable 'abstract idea' . . ." *Id.* at 20.

21       27. Although the parties filed other summary judgment motions in the *Priceline* case,  
 22 Priceline chose not to file a summary judgment motion to challenge the patent eligibility of the '849  
 23 patent.

24       28. In the matter of *IBM v. Groupon, Inc.*, C.A. No. 1:16-cv-00122 (D. Del.), Groupon,  
 25 Inc. ("Groupon") moved for judgment on the pleadings that the '849 patent was directed to ineligible

1 subject matter. The court denied Groupon's motion, finding that "the asserted claims for the Filepp  
 2 patents are not directed to an abstract idea and are directed to patent-eligible subject matter." *IBM*  
 3 *v. Groupon, Inc.*, 289 F. Supp. 3d 596, 607 (D. Del. 2017) (attached as Ex. 74).

4 29. Although the parties filed other summary judgment motions in the *Groupon* case,  
 5 Groupon chose not to challenge the patent eligibility of the '849 patent. The case proceeded to trial.  
 6 The jury rendered a verdict of willful infringement and no invalidity on all four of the patents-in-  
 7 suit, including the '849 patent, thus further showing the continued importance and relevance of the  
 8 invention of the '849 patent to modern network technology. Ex. 75 at 1-2.

9 30. The matters of *IBM v. Expedia* and *IBM v. Airbnb* also involved the '849 patent.  
 10 None of the defendants in those litigations filed motions that challenged the patent eligibility of the  
 11 '849 patent.

12 **E. IBM Invented Methods For A Runtime User Account Creation Operation Using A  
 13 Single-Sign-On Process In A Federated Computing Environment.**

14 31. The inventors of the '346 patent developed the patented technology as part of IBM's  
 15 efforts to improve single-sign-on technology. Online service providers, like website operators,  
 16 typically use "sign-on" operations to manage access to protected resources, like confidential  
 17 webpages. '346 patent at 6:26-30. A user signs-on by providing authentication credentials, such as  
 18 a username and password, which the service provider verifies to authenticate the user's identity. *Id.*  
 19 at 6:31-36. Then, the service provider can determine whether the identified user has authorization  
 20 to access the protected resource and, if so, grants access. *Id.* at 6:37-43, Fig. 1C. Although that  
 21 process has become commonplace, it is time consuming for users to sign-on every time they wish to  
 22 access a protected resource. *Id.* at 1:25-33.

23 32. One way to address the shortcomings of repetitive sign-on operations is to  
 24 authenticate users for an entire "session," *i.e.*, a series of multiple transfers of information between  
 25 the server and the client. *Id.* at 1:53-61, 6:17-22. That technology is called *single*-sign-on because

1 users are only required to sign-on once per session. *Id.* at 1:53-61. For example, users could enter  
 2 a user name and password on the homepage of a service provider and request multiple protected  
 3 webpages without reentering their credentials. But prior art single-sign-on methods were  
 4 problematic because they required users to have preexisting user accounts at the service provider.  
 5 *Id.* at 2:19-42.

6 33. As Dr. Heather Hinton, first named inventor of the '346 patent, testified in prior  
 7 proceedings, prior art systems could not take advantage of the full benefits of single-sign-on because  
 8 of this fundamental problem.<sup>5</sup>

9 34. The inventors of the '346 patent sought to develop single-sign-on technology that  
 10 would permit a new user of a service provider to access protected resources. They developed novel  
 11 methods for systems interacting within a “federated computing environment” to trigger a single-  
 12 sign-on operation on behalf of a user that would obtain access to a “protected resource” and create  
 13 an account for the user. The specification discloses how to structure a “federated computing  
 14 environment” using a nonconventional arrangement of computer components. *Id.* at 10:62-11:7,  
 15 11:28-35. The specification describes a “protective resource” using precise technical terms that  
 16 demonstrate “how” to solve the limitations of prior art single-sign-on operations. *Id.* at 5:60-67,  
 17 6:26-30, 8:45-48, 11:28-35. And it specifies the “ordered combination” of technical steps necessary  
 18 to implement the claimed embodiments. *See, e.g., id.* at Figs. 9, 11.

19 35. One implementation of the '346 patent involves using “tokens” to facilitate such  
 20 interactions. “A token provides direct evidence of a successful operation and is produced by the  
 21 entity that performs the operation, e.g., an authentication token that is generated after a successful  
 22 authentication operation. A Kerberos token is one example of an authentication token that may be  
 23 used with the present invention.” *Id.* at 8:49-54. Such binary security tokens can implement web  
 24 services message-level security. When a user accesses a service provider and signs into the identity

25 <sup>5</sup> *See* Ex. 76 at 383:17-386:6 (Heather Hinton’s Testimony in *IBM v. Groupon*)

1 provider via single-sign on operations, the identity provider authenticates the user. The identity  
 2 provider provides a token to the service provider “to provide proof of authentication of a user.” *Id.*  
 3 at 22:15-19. The service provider would in turn, “translate” the identity provider’s token into a  
 4 “locally valid user identifier...based on information contained in the [] token” in order to “build a  
 5 local session for the user.” *Id.* at 24:16-25:3. After the user has been found to be authenticated by  
 6 the identity provider, the system provider can then create an account for the user at the service  
 7 provider, thus bypassing any requirement for the user to directly create an account at the service  
 8 provider.<sup>6</sup> The ’346 patent thus extends the benefits of single-sign-on technology to allow the user  
 9 to access protected resources at any number service providers without having to first set up a user  
 10 account.

11       36. Some of the technical solutions and innovative aspects of the ’346 patent are set forth  
 12 in the technology tutorial that IBM submitted in the *IBM v. Groupon* litigation. Ex. 71 at timestamp  
 13 10:39.

14       37. Before this suit, the ’346 patent had been unsuccessfully challenged on grounds of  
 15 alleged patent eligibility. In the matter of *IBM v. The Priceline Grp., Inc.*, C.A. No. 1:15-cv-00137  
 16 (D. Del.), Priceline filed a motion to dismiss, alleging that the ’346 patent was directed to  
 17 unpatentable subject matter. The Delaware court denied the motion, finding the patent was not  
 18 directed to an abstract idea; “the true heart of the invention is the utilization of SSO technology to  
 19 automatically create an account at the service provider level on behalf of users who did not  
 20 previously have such accounts, all in order to allow the user to access protected resources at the  
 21 service provider.” *IBM v. The Priceline Grp., Inc.*, 2016 WL 626495, at \*16 (D. Del. Feb. 16, 2016)  
 22 (attached as Ex. 72). The Court also rejected the argument that the claim did not contain inventive  
 23 aspects: “The specification describes the improvement over the prior art encompassed by the

24       <sup>6</sup> See Ex. 76 at 380:14-383:1, 386:7-388:11 (Heather Hinton’s Testimony in *IBM v. Groupon*)  
 25 (describing the “token” implementation of the ’346 patent as disclosed in the TFIM System Design  
 Document).

1 invention as the ‘eliminat[ion] [of] these prerequisites’ because while ‘[i]n the prior art, the service  
 2 provider cannot automatically create an active session for the user and allow access to protected  
 3 resources; with the present invention, the service provider dynamically performs a runtime linked-  
 4 user-account creation operation at the service provider by creating a linked user account based on  
 5 the user identity . . . that has been provided by the identity provider to the service provider[.]’’ *Id.*  
 6 at \*19.

7       38.     Although the parties filed summary judgment motions in the *Priceline* case, Priceline  
 8 chose not to file a motion to challenge the patent eligibility of the ’346 patent.

9       39.     In the *IBM v. Groupon* case, Groupon chose not to file any motions challenging the  
 10 patent-eligibility of the ’346 patent at the pleading stage or at the summary judgement stage. The  
 11 case proceeded to trial. The jury rendered a verdict of willful infringement and no invalidity on all  
 12 four of the patents-in-suit, including the ’346 patent, thus further showing the continued importance  
 13 and relevance of the invention of the ’346 patent to modern network technology. Ex. 75 at 1-2.

14       40.     The matters of *IBM v. Expedia* and *IBM v. Airbnb* also involved the ’346 patent.  
 15 None of the defendants in those litigations filed motions that challenged the patent eligibility of the  
 16 ’346 patent.

17       41.     The Federal Circuit has interpreted the claims of the ’346 patent in an appeal  
 18 concerning two final written decisions issued by the PTAB. In reversing the PTAB’s finding that a  
 19 subset of claims of the ’346 patent were anticipated by prior art, the Federal Circuit explained that  
 20 the ’346 patent solves “the special challenges of providing single-sign-on capabilities in a ‘federated’  
 21 environment,” which the court understood as an environment containing different enterprises that  
 22 “adhere to certain standards of interoperability.” *IBM v. Iancu*, 759 Fed. Appx. 1002, 1004-1005  
 23 (Fed. Cir. 2019) (attached as Ex. 77). The Federal Circuit distinguished how the prior art approached  
 24 authentication from how the ’346 patent solved the problem by looking at how the claimed  
 25 “federated computing environment” and “single-sign-on” operated in the context of the invention.

1 *Id.* at 1007-1009. The Federal Circuit's opinion confirms that the '346 patent is directed to a non-  
 2 abstract computer-specific problem and involves innovation in "how" to solve the limitations of  
 3 prior art single-sign-on techniques.

4 **F. IBM Invented Artificial Intelligence Techniques For Determining The Condition Of A  
 5 Geographic Area By Directly Analyzing Unstructured Image Data Using Supervised  
 6 Learning.**

7 42. Artificial intelligence (AI) and Machine Learning are two fields of computer science  
 8 which focus on inventing new technologies that provide computers with the ability to "learn" and  
 9 "think" on their own, without human intervention. More specifically, AI is concerned with creating  
 10 computers that have the ability to discover insights on their own. AI often uses machine learning to  
 11 achieve this goal. Machine learning researchers create solutions that allow computers to learn from  
 12 sets of data, and make predictions and decisions based on said data, in a way that mimics human  
 13 "learning" or "thinking" but that is inherently wholly different from how humans "learn" and  
 14 "think."

15 43. IBM is a pioneer in both AI and machine learning. As early as the 1950s, IBM  
 16 computer scientists began working on "chess computing," or teaching a computer to play chess. In  
 17 order for a computer to successfully play a game of chess, it must have the ability to make decisions  
 18 about which moves to make, as a person would. IBM's efforts culminated in Deep Blue, a chess  
 19 computer pictured below. Deep Blue's computing system used various algorithms and machine  
 20 learning tools to consider over 200 million possible chess positions per second, in order to select the  
 21 move with the greatest probability of success. On May 11, 1997, Deep Blue defeated the reigning  
 22 world chess champion, Garry Kasparov, after a six-game match:

23  
 24  
 25



Ex. 32 (<https://www.ibm.com/blogs/think/2017/05/deep-blue/>).

11       44. From Deep Blue, IBM went on to develop even more advanced AI and machine  
12 learning technologies, including Watson, IBM’s suite of AI and machine learning-based services  
13 and applications. Watson additionally uses Natural Language Processing (NLP), or the ability of a  
14 computer to read and understand sentences as a person would, to further approximate “thinking” like  
15 a human using complex processes uniquely tailored to the limitations of computers and machine  
16 languages. To this day, IBM’s Watson technology has been applied to solve numerous real-world  
17 problems, such as city infrastructure planning and personalized school curriculum design, among  
18 many others. In 2011, an IBM Watson computer even defeated two Jeopardy! quiz show champions:



Ex. 33 (<https://www.cbsnews.com/news/ibm-watson-defeats-humans-in-jeopardy/>).

45. Computer vision is a sub-field of AI and machine learning technology, which focuses on teaching computers to “think” like a human in order to “see” and derive information from visual images. Researchers and companies in various industries have long been interested in creating computer systems that can make decisions by analyzing image and video data. For example, in the real estate industry, a computer system may analyze a picture of a house, and determine that the house has image patterns that correlate with certain positive or negative characteristics. The computer system may then assign a score to the house indicating its condition or generate an appraisal of the house’s value. Automating tasks like computing house ratings or generating appraisals with a computer system can greatly benefit the real estate industry by allowing computers to perform tasks that were previously left to humans. A computer can also improve the accuracy of real estate appraisal algorithms by incorporating image and video data, which traditionally have not been used extensively in automated real estate appraisals.

1       46.    However, computers face challenges when interpreting image and video data. Some  
 2 of these challenges stem from the distinction between structured and unstructured data. Structured  
 3 data is organized and formatted in a way that allows a computer to easily process it for a given  
 4 application using conventional approaches. For example, data about a house—like its address, zip  
 5 code, and city—may reside in a table in a relational database, like the table shown below:

Residence					
Type	Street	City	State	Zip	Occupied
House	123 Main St.	Franklin	Tennessee	37064	Yes
Apartment	456 Broadway	Springfield	Missouri	54321	No
Condo	789 East Ave.	Metropolis	Illinois	13579	No

10      This data is “structured” since a computer can use conventional approaches to process the data for  
 11 certain applications. For example, a computer can easily generate a listing of unoccupied residences  
 12 by using conventional Structured Query Language (SQL) to retrieve all the records from the table  
 13 where the “Occupied” field is “No.”

14      47.    In contrast to structured data, unstructured data is not organized or formatted in a way  
 15 that would allow a computer to process the data for a given application using conventional  
 16 approaches. For example, an image of a house may contain a swimming pool. The image file  
 17 consists of a sequence of pixels, each with different red-green-blue (“RGB”) values. This data is  
 18 well-structured for a computer to display the image through a conventional photo application by  
 19 computing the values of individual pixels. However, the image is unstructured for other tasks, such  
 20 as determining whether the image contains a swimming pool. A human looking at the image can  
 21 use instinct, common sense, and experience to quickly determine that the image displays a house  
 22 with a swimming pool. However, a computer cannot use instinct, common sense, and experience  
 23 the same way a human can to make this classification. And the computer cannot determine that the  
 24 image contains a swimming pool through conventional methods like computing the RGB values of  
 25

1 individual pixels comprising the image. Thus, a need existed for the capability of computers to  
 2 interpret such unstructured data.

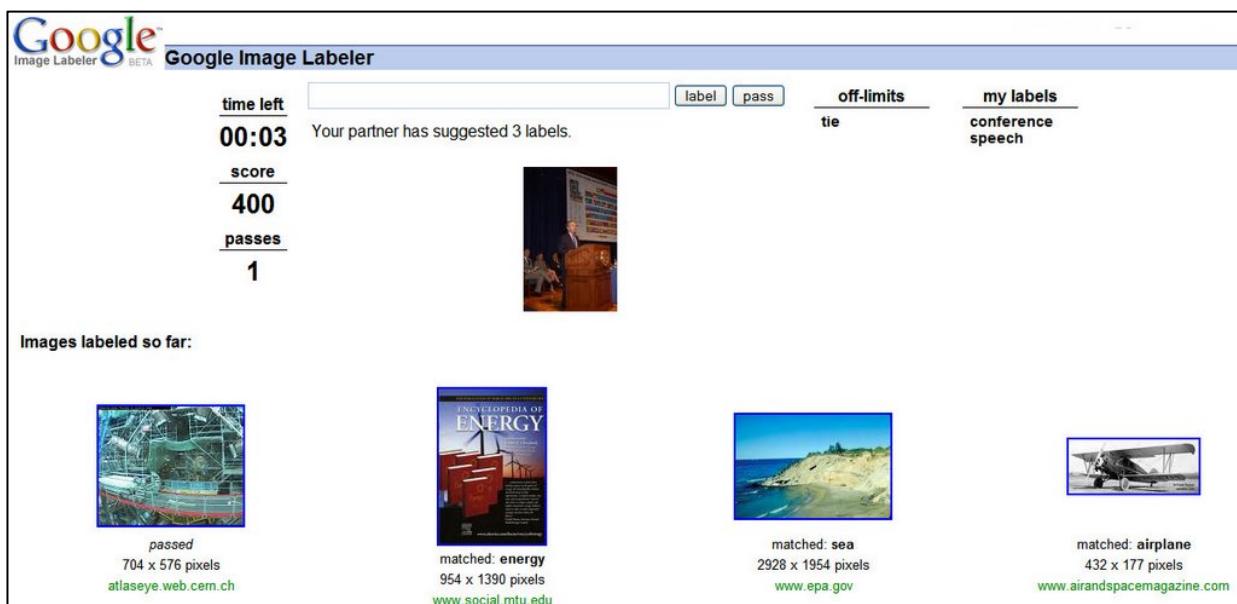
3       48. At the time of the invention of the '183 patent, a number of conventional methods  
 4 were used by computers to interpret unstructured image and video data, such as pictures or videos  
 5 of houses. However, each of these prior methods differed from the patented invention of the '183  
 6 patent and had significant disadvantages. One such method was the "manual labeling" approach to  
 7 interpreting image and video data, in which a computer extracted information from an image by  
 8 using human-created labels or scores as proxies for information contained within the image. For  
 9 example, a human data processor may label and score different aspects of an image of a home, such  
 10 as a broken window and a missing shingle, and then feed the labeled image into the computer system.  
 11 The computer detected the human-created labels "broken window" and "missing shingle" and scored  
 12 the image according to those labels.

13       49. The "manual labeling" approach differs from the patented invention of the '183  
 14 patent because the computer in a manual labeling system analyzes the label rather than the image to  
 15 extract information about the image. The "manual labeling" approach also suffers from several  
 16 downsides. A computer typically must train on thousands or millions of labeled images to  
 17 consistently make accurate predictions. Data processors must caption, label or score each individual  
 18 image, which may take months or years, and cost tens of thousands of dollars. Human data  
 19 processors are also prone to error and bias. A data processor may forget to label a missing shingle  
 20 in an image of a home. A realtor may choose not to label the missing shingle or broken window to  
 21 achieve a higher home valuation. Human data processors may also fail to evaluate individual  
 22 features of a home. For example, a data processor may label a home as containing a swimming pool,  
 23 but neglect to assign a score or descriptive label to the swimming pool, preventing the computer  
 24 from accurately assessing that individual aspect of the image.

25

1       50.     Another method of the prior art was the “crowdsourcing” approach to interpreting  
 2 image and video data, in which a computer interpreted image data by collecting labels sent by a large  
 3 number of people over the internet. The computer assigned the most popular labels to the image and  
 4 interpreted the image according to those labels. For example, if most users labeled a certain aspect  
 5 of an image as a “broken window”, the computer would assign the label “broken window” to that  
 6 aspect and interpret the image according to that label.

7       51.     One example of crowdsourcing is the Google Image Labeler, launched by Google in  
 8 2006. Through the Image Labeler game, Google enlisted the help of millions of online users in order  
 9 to choose the category of features found within Google’s database of images. In the game, two  
 10 different users would be shown the same set of images, and each player would earn points for giving  
 11 the same label or category (such as “Dogs,” “Cats,” “Food,” “Cars,” etc.) to a photograph. Google  
 12 used these user-inputted labels to improve its image classification software. An example of Google  
 13 Image Labeler gameplay is shown below:



23       Ex. 34 (Google Image Labeler, Google Operating System: Unofficial news and tips about  
 24 Google, <http://googlesystem.blogspot.com/2006/09/google-image-labeler.html>).  
 25

1       52.    However, just like the “manual labeling” approach, the “crowdsourcing” approach  
 2 differs from the patented invention of the ’183 patent because the computer analyzes the label rather  
 3 than the image to extract information about the image. The crowdsourcing approach also suffers  
 4 from the same problems as manual labeling, including the risks of human bias and error.  
 5 Crowdsourcing encounters other challenges as well. A home appraisal company must spend time  
 6 and money identifying a large number of users willing to provide labels, and then send the images  
 7 to those users. The company may also need to provide guidance to the users about how to label the  
 8 images. Furthermore, the risk of inconsistently applied labels increases as the crowd gets larger.

9       53.    Another prior art method was the “metadata” approach to interpreting image and  
 10 video data, in which a computer extracted labels from the webpage displaying the image. For  
 11 example, a webpage displaying an image of a home with a broken window may contain an HTML  
 12 tag indicating that the home contains a broken window. This HTML tag is metadata because it  
 13 describes the image data contained on the webpage. The computer can read this HTML tag to  
 14 determine that the home contains a broken window and interpret the image according to this label.

15       54.    The metadata approach differs from the invention of the ’183 patent because the  
 16 computer classifies the image by extracting data from the webpage rather than directly analyzing the  
 17 image itself. The metadata approach also suffers from several downsides. A webpage’s HTML may  
 18 not tag all of the relevant features of the image, such as a broken window. Also, the webpage owner  
 19 may change the tag for a particular feature, requiring the computer system to update its search criteria  
 20 to detect the new tag. For example, the webpage owner may change the tag “broken window” to  
 21 “window that is broken.” The computer system must then update its search criteria to detect images  
 22 containing this new tag. Updating the computer system every time a webpage’s metadata changes  
 23 is time-consuming, expensive, and inefficient.

24       55.    Yet another prior art approach was the “unsupervised machine learning” (UL)  
 25 approach to interpreting image data, in which the computer directly analyzed the image without

1 relying on human-created reference data. The computer may use a variety of methods to interpret  
 2 the image without reference data, such as by grouping together images of homes that contain broken  
 3 windows, or recognizing that homes with broken windows are also missing shingles.

4       56.     A UL system differs from the invention of the '183 patent because it interprets image  
 5 data without using any human-created reference data (such as historical baseline values). A UL  
 6 system also suffers from numerous drawbacks. A UL system cannot standardize inputs and outputs  
 7 because the possible features and scores of the image data are not known until the UL system finishes  
 8 processing the image. This lack of standardized input and output makes it difficult to incorporate a  
 9 UL system into an algorithm, such as a real estate appraisal algorithm. Moreover, without reference  
 10 data, a UL system cannot easily improve its accuracy based on past classifications, but instead must  
 11 generate new classifications every time it processes new image data. The UL system therefore can  
 12 only make precise predictions after it has processed a large amount of data.

13       57.     Another approach to interpreting image data is analyzing a geographic area to detect  
 14 individual features, and then assigning a score to the overall geographic area based on those features.  
 15 This approach differs from the invention of the '183 patent because it only scores the geographic  
 16 area as a whole, and fails to score individual locations within that area. For example, a computer  
 17 may detect a lawn in front of a home, and use that feature to assign an overall score to the home.  
 18 But the computer does not assign a score to the lawn itself. A system that fails to score individual  
 19 features cannot make nuanced yet valuable real estate classifications. For example, a user may put  
 20 particular weight on the conditions of lawns in a particular neighborhood when browsing real estate  
 21 listings. But the computer cannot tailor its scoring of real estate listings for this particular user  
 22 according to the quality of the lawns, since the computer never assigns a score to that particular  
 23 feature within the geographic area.

24       58.     In sum, the prior art used a number of conventional approaches to interpret image  
 25 data through a computer system, all of which encountered significant challenges. Some of these

1 prior art methods—like manual labeling, crowdsourcing, and metadata extraction—used  
 2 conventional techniques to process image data through human-created proxies, like labels and  
 3 HTML tags. Other methods—like unsupervised machine learning—used conventional techniques  
 4 to directly analyze the image. However, these techniques failed to analyze the image data directly,  
 5 did not use human reference data, did not standardize inputs or outputs, and/or did not assess  
 6 individual features and locations in a geographic area.

7       59. The inventors of the '183 patent improved on these methods by conceiving of an  
 8 innovative and unconventional way for computers to directly assess and score geographic location  
 9 data, like images and videos. '183 patent at 3:46-4:17. Their approach started with the idea that  
 10 there existed in the world a large amount of publicly-available, unutilized geographic location data,  
 11 such as images and videos. *Id.* at 3:7-12. Examples of this geographic location data include video  
 12 feeds from security cameras, photos taken on cell phone cameras and then uploaded to social media  
 13 and the Internet, images and videos from news stories, and even non-image data like heat waves,  
 14 radiation, and magnetism. *Id.* at 3:7-12, 4:8-17. For example, house hunters trying to locate a  
 15 neighborhood or a specific home had access to a large quantity of publicly-available image data  
 16 showing the conditions within these homes or neighborhoods. *Id.* at 3:7-12. Programs like Google  
 17 Street View captured large amounts of image data that contained information about qualities  
 18 determinative of whether a neighborhood, or a particular home within a neighborhood, is desirable,  
 19 such as whether a property has well-maintained landscaping, intact windows, ample lighting from  
 20 street lamps, freshly painted walls, or no graffiti. *Id.* at 4:27-31, 4:52-57, 5:3-8; Figs. 2A-C.

21       60. But while this data contained valuable information about its subject matter, it was not  
 22 structured to allow the computer to detect individual geographic features in the data and assign  
 23 condition scores to the data using conventional techniques. For example, a computer could not use  
 24 conventional statistical analysis to determine that an image of a house contained a broken window  
 25 and assign a condition score to that feature. The inventors of the '183 patent recognized that a

1 computer system that can directly analyze individual features of an image or a video, with guidance  
 2 from human created reference data but without the need to manually label every relevant feature of  
 3 a geographic area, would greatly improve automated real estate appraisal algorithms.

4       61. With these goals in mind, the inventors of the '183 patent created a novel and  
 5 unconventional technique for a computer to determine a score representing the location conditions  
 6 of a given geographic location—like a home, neighborhood, or city— by directly analyzing the  
 7 image data, scoring individual features in the geographic area through comparison to reference data,  
 8 and accounting for user preferences.

9       62. The invention of the '183 patent contains several inventive aspects. First, the  
 10 invention disclosed the ability to assign scores to geographic location data like images by directly  
 11 analyzing the data itself, rather than interpreting human-created proxies of the underlying data. '183  
 12 patent at 3:25-28. The system obtains data from a geographic location, such as an image or video,  
 13 and directly analyzes that data to identify elements in the data, such as broken windows or damaged  
 14 cars. *Id.* at 3:28-32; Figs. 2A-C. The system assigns a score to the geographic location based on  
 15 the detected features. *Id.* at 4:34-51, 5:9-20. The system further calculates condition scores for  
 16 entire geographic areas and generates a map indicating the condition scores of geographic locations  
 17 based on the detected elements. *Id.* at 4:50-51, 5:20-31. The system can generate a map showing  
 18 average condition scores at different levels of granularity, such as at the street, neighborhood, or city  
 19 level. *Id.* at 6:17-29; 6:39-41; Figs. 3A-B. Furthermore, the system improves upon prior art methods  
 20 by interpreting a wide range of unstructured data—not just images and videos—but also information  
 21 about physical stimuli, like heat, motion, or pressure. *Id.* at 4:13-17.

22       63. For example, the '183 patent describes “[c]apturing image data associated with a  
 23 known location (a geographic area) . . . from, *inter alia*, traffic cameras, security cameras, personal  
 24 cameras, etc.” '183 patent at 3:46-48; Fig. 1. The system then “[a]nalyz[es] contents within an  
 25 image for discrete elements aligned to categories representative of various environmental

1 conditions.” *Id.* at 3:51-53; Figs. 2A-C. The system “scor[es] each element relative to an identified  
 2 ‘best’ and ‘worst’ case state.” *Id.* at 3:58-59; Figs. 2A-C. The patent further states that “[t]he  
 3 generated scores are plotted on a scalable map, table, or chart for reference”, and that the map may  
 4 “indicate[] [an] overall condition score value associated with [a] specified geographical area.” *Id.*  
 5 at 3:42-43, 2:16-18; Figs. 3A-B. The patent also describes methods of interpreting a wide range of  
 6 unstructured data, such as “heat, light, sound, pressure, magnetism, and/or a particular motion.” *Id.*  
 7 at 4:13-17. The patent states that “with respect to the non-image data,” “condition score values  
 8 associated with multiple locations are . . . “interpolated.” *Id.* at 6:54-58; Figs. 4-5. The methods and  
 9 systems of the ’183 patent therefore describe the inventive concept of computing condition scores  
 10 for a geographic location by directly analyzing unstructured data, rather than merely interpreting  
 11 human proxies for that data.

12       64.       Another inventive aspect of the ’183 patent is the ability to assess individual features  
 13 of a geographic area, and use those assessments to personalize condition scores and location results  
 14 for particular users. ’183 patent at 3:46-4:17. This aspect is an improvement over the prior art  
 15 systems and methods, which produced condition scores for the overall area rather than individual  
 16 features. The ’183 patent discloses detecting individual elements in data associated with a  
 17 geographic location and assigning a score to each individual element. *Id.* at 3:58-65; Figs. 2A-  
 18 C. The system can also aggregate scores across elements to compute a score for an entire geographic  
 19 location. *Id.* at 5:20-37; Figs. 3A-B. A user can also tailor their search by identifying relevant  
 20 elements. *Id.* at 3:66-4:3. For example, a user may want to view homes with high-scoring lawns,  
 21 yet remain indifferent to the types of cars in the neighborhood. The user can use the technology of  
 22 the ’183 patent to perform a search for homes matching their preferences. The system and methods  
 23 of the ’183 patent enable this type of personalization by scoring individual elements and locations  
 24 in a geographic area—an unconventional approach not found in the prior art. *Id.* at 3:46-4:17. For  
 25 instance, the ’183 patent states that “a single image may comprise multiple elements each comprising

1 associated scores.” *Id.* at 3:64-65. Indeed, the system “[a]nalyz[es] contents within an image for  
 2 discrete elements aligned to categories representative of various environmental conditions,” which  
 3 are then used to identify the “key conditions [by] … comparing the elements to a database of stored  
 4 images.” *Id.* at 3:51-53, 4:32-34.

5       65. The ’183 patent goes on to describe “[a]n algorithm [that] is enabled for scoring each  
 6 of the key conditions.” ’183 patent at 4:34-35; Fig. 4. Such an algorithm is captured in the claims,  
 7 which recite, for example, “comparing . . . image data to a plurality of stored image data . . . [which]  
 8 comprise baseline measurement values associated with an expected condition level,” “calculating .  
 9 . . . condition score values [that] indicate real time condition values associated with a plurality of  
 10 locations,” and “calculating . . . an overall condition score value associated with said specified  
 11 geographic area.” *Id.* at 10:17-30, 11:24-36, 12:38-51. The ’183 patent further states that  
 12 “[a]dditional aggregate scores may be generated by averaging all of the aforementioned scores.” *Id.*  
 13 at 5:28-29.

14       66. The ’183 patent further describes an unconventional algorithm enabling a computer  
 15 to compute condition scores using baseline data. ’183 patent Fig. 4. First, “historical image[s] [are]  
 16 stored with a preconfigured image type, a preconfigured condition score, and a specified location  
 17 identifier.” *Id.* at 5:60-63. After the system establishes all of the reference images, “a steady state  
 18 mode for analysis is initiated.” *Id.* at 5:67. Next, “an updated image is obtained” and “a matching  
 19 (or similar image) is retrieved from the index database.” *Id.* at 6:1-2. The ’183 patent goes on to  
 20 state that “if [] it is determined that the variance values do comprise a difference sufficient for  
 21 reevaluation then [] condition scores are recalculated” and “the matching image and recalculated  
 22 condition scores are stored.” *Id.* at 6:8-12.

23       67. The ’183 patent also describes how the inventive concept of individual feature  
 24 scoring is used to create more granular search criteria for users. The system allows users to “select  
 25 elements relevant to a subjective view of neighborhood conditions” such as “a condition of buildings

1 and cars with respect to street conditions, tree conditions, etc.” ’183 patent at 3:66-4:3. The system  
 2 then “calculates a score for each location associated with retrieved image data based on elements  
 3 and weightings selected by the user.” *Id.* at 4:4-7. The ’183 patent therefore describes the inventive  
 4 concept of directly analyzing image data about a geographic area and scoring individual features and  
 5 locations within that area, both to compute an aggregate score for the entire area, and to allow users  
 6 to tailor their searches based on preferences for certain conditions. This granular and personalized  
 7 scoring of geographic location data is an improvement over prior art systems and methods which  
 8 only scored the geographic area as a whole.

9       68.     Another inventive aspect of the ’183 patent is the use of human-created reference  
 10 data to compute scores for geographic locations, in the form of a “condition index database”  
 11 containing “historical image[s].” ’183 patent at 5:58-67. This unconventional approach is an  
 12 improvement over prior art systems which used unsupervised machine learning to score locations  
 13 without any baseline data. These unsupervised systems generated unpredictable and unstandardized  
 14 classifications and scores that were difficult to incorporate into automated algorithms. The inventors  
 15 of the ’183 patent improved on such systems by conceiving of an unconventional method for  
 16 computers to score geographic location data in a standardized and predictable way by utilizing pre-  
 17 configured baseline data from an “index database.” *Id.* at 5:67-6:15.

18       69.     The ’183 patent also discloses storing historical reference data for later reference.  
 19 ’183 patent at 6:10-12. Each piece of such reference data contains a “preconfigured image type, a  
 20 preconfigured condition score, and a specified location identifier.” *Id.* at 5:60-63. When the  
 21 computer system interprets real-time data, it can compare the real-time data with that reference data.  
 22 *Id.* at 6:2-4. If the system determines that the real-time data represents the same location as the  
 23 reference data, the system can compare the real-time data with the reference data to determine  
 24 whether the preset condition scores for that location have changed. If the scores have changed, the  
 25 system can update the scores for the reference data and score the real-time data accordingly. *Id.* at

1 6:2-12. By using this unconventional approach of computing condition scores using baseline  
 2 reference data, the invention of the '183 patent clearly defines the scored conditions and produces  
 3 predictable and standardized output that can be easily incorporated into an algorithm, such as a real  
 4 estate appraisal algorithm.

5       70. Moreover, the algorithm described in the '183 patent ties together the inventive  
 6 concepts of the invention into an “ordered combination,” specifically enabling computers to directly  
 7 evaluate and score geographic location data. '183 patent Fig. 4. For example, after the system  
 8 compares the real-time images to the baseline images, “scores for addresses without images are  
 9 interpolated.” *Id.* at 6:16-17. The algorithm also includes a step for receiving “user input factors or  
 10 default factors (associated with geographical condition attributes).” *Id.* at 6:52-54. The algorithm  
 11 goes on to describe scoring individual features of a given geographical location, stating that “street  
 12 condition scores associated with streets located within the specific geographical area and  
 13 neighborhood condition scores associated with neighborhoods comprising the streets are  
 14 calculated.” *Id.* at 6:60-63.

15       71. The '183 patent therefore describes a novel and unconventional system and method  
 16 specifically conceived to enable computers to directly analyze and score geographic location data.<sup>7</sup>  
 17 Indeed, the inventors of the '183 patent recognized that these systems and methods could achieve  
 18 real-world impacts that were simply unattainable by prior art methods. For example, the inventors  
 19 of the '183 patent envisioned that the claimed invention could be used to further IBM's Smarter  
 20 Cities efforts, in order to improve neighborhood public safety.

21       72. The IBM Smarter Cities initiative focuses on using technologies like AI and big data  
 22 to improve the functioning of city governments, as well as the quality-of-life of citizens in general.  
 23

24       7 For further discussion of the computer-specific problems to which the claims are directed and  
 25 inventive aspects therein, see the Declaration of Dr. Douglas Schmidt (attached herein as Ex. 78),  
 and the Declaration of Richard Haas, (attached herein as Ex. 79), the first named inventor of the '183  
 patent.

1 The '183 patent's inventors recognized that the novel and unconventional techniques of the patent  
 2 could be used by local police departments to augment public safety efforts and improve the  
 3 efficiency of the police force. Police departments could use the invention of the '183 patent to  
 4 automatically convert streams of security camera footage into condition scores which give a clear  
 5 indication of which areas are at high risk, and may require police presence. For example, an area  
 6 with a burning fire, congregating individuals, and cars with broken windows would be given an  
 7 overall condition score value corresponding to a high risk situation, and the local police would be  
 8 alerted that police attention is needed in that area. By providing greater situational intelligence in a  
 9 hyper-localized context, the invention of the '183 patent could significantly reduce crime levels by  
 10 increasing the efficiency of the police force—a real-world impact of the '183 patent that is a drastic  
 11 improvement over the prior art.

12       73.    Zillow itself acknowledges many of the inventive concepts of the '183 patent. In a  
 13 June 27, 2019 article, Zillow stated that its home valuation tool “ the Zestimate” is “getting an  
 14 upgrade,” and the “new Zestimate uses computer vision to analyze photos of a home to understand  
 15 not just its facts and figures, but its quality and curb appeal.”<sup>8</sup> Zillow explained that computers  
 16 assess image data differently than humans, noting that “there was no way for computers to look at  
 17 photos of a home and get the same information that humans do.”<sup>9</sup> Zillow went on to point out that  
 18 a computer system which directly analyzes image data is inventive, writing that “incorporating  
 19 computer vision and advanced machine learning models into the Zestimate algorithm enables us, for  
 20 the first time, to give consumers a more quantitative accounting of the qualitative aspects of their  
 21 home.”<sup>10</sup> Zillow also appreciated the value of a computer system that can evaluate image data by  
 22 comparison to baseline data, writing that “we’ve taught the Zestimate to discern quality by training

23  
 24       <sup>8</sup> Ex. 96 (<https://medium.com/@StanHumphries/introducing-a-new-and-improved-zestimate-algorithm-7a5b831712c7>) at 2.

25       <sup>9</sup> *Id.*

<sup>10</sup> *Id.*

1 convolutional neural networks with millions of photos of homes on Zillow.”<sup>11</sup> Zillow further  
 2 recognized that Zestimate’s ability to directly analyze image data about homes benefits the real estate  
 3 industry, declaring that “photos provide consumers a rich source of information about a home’s  
 4 quality” and that “[t]hanks to these improvements. . . Zestimate now has a median error rate of less  
 5 than 2 percent for homes listed for sale, meaning half of all Zestimates fall within 2 percent of the  
 6 home’s eventual sales price” and “[i]ncorporating these new technologies and data sources . . . helps  
 7 provide a more accurate home value estimate.”<sup>12</sup> Zillow’s statements are further evidence that the  
 8 systems and methods of the ’183 patent are novel and unconventional.

9 **G. IBM Invented Methods That Allowed Users To Precisely Select And Filter Search  
 10 Results Within Geographic Areas Of Interest On A Computer-Implemented  
 11 Graphical User Interface By Synchronizing Map Displays And List Displays.**

12 74. The inventions of the ’789 patent provide a new way of filtering and presenting  
 13 geospatial data in response to user interaction. At the time of the inventions of the ’789 patent,  
 14 increases in computing power and storage allowed an ever-growing amount of data to be stored in  
 15 digital databases. A common type of data was geospatial data—that is, data that can be represented  
 16 on a map—which presented additional specific challenges. An example of geospatial data are points  
 17 of interest, which can be indicated with icons that are overlaid on a map. The computing devices of  
 18 the time were able to search through millions of such points of interests and display those results in  
 19 a map, as well as displaying information about those results. At the same time, advances in  
 20 computing devices allowed users to interact with the results in new ways, such as allowing a user to  
 21 click an area of the map occupied by an interactive icon to display a balloon containing additional  
 22 information about said icon.

23 75. However, the technology at the time limited how that data could be displayed and  
 24 how users were able to interact with it. In particular, the mapped geospatial data was not dynamically  
 25

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<sup>11</sup> *Id.*

<sup>12</sup> *Id.*

1 responsive to the user's selections in the way claimed by the inventors of the '789 patent. In the  
 2 prior art, users were presented with all, or a set number, of results that fit within the area of the screen  
 3 designated for the map, and users could not select a subset of data to be displayed in the way claimed  
 4 by the '789 patent. For example, when results were displayed on a map in response to a user's search  
 5 for hotels, the user could not then select a subset of the hotels to automatically update the map to  
 6 only show the selected hotels. The prior art's approach to providing search results thus had several  
 7 limitations. While helpful for users to be able to visualize the location of search results, prior art  
 8 approaches did not allow for a user to create a customized search area to fit a user's specific  
 9 geographical needs. For example, a person searching for rental properties may want to search within  
 10 an irregular shaped area determined by the acceptable walking distances between several modes of  
 11 public transportation. Or they may wish to create a search that excludes particularly noisy blocks,  
 12 tourist attractions, or neighborhoods that they wish to avoid.

13       76.     The inventors of the '789 patent encountered these obstacles in their development of  
 14 IBM's Intelligent Operations Center for Smarter Cities ("IBM's IOC"), which allowed personnel in  
 15 command centers to track conditions and events on an interface containing a geospatial map and an  
 16 associated list display. For example, in IBM's IOC, city personnel could monitor a wide range of  
 17 city assets, from sidewalks and sewers to police cars and traffic lights. The software drew on  
 18 information collected from multiple sensors, such as traffic cameras and rain meters, to enable  
 19 personnel to quickly assess the status of assets and their impact on particular city services. During  
 20 events, these personnel could use the software for real-time monitoring and to coordinate responses,  
 21 such as placing traffic signs at different locations, or transporting police. But these personnel also  
 22 needed to be able to interact with the map to select specific city assets or ensure city resources were  
 23 ready for emergencies. Further, they needed to be able to track different categories of conditions  
 24 and components. For example, city personal might need to track the conditions of water lines at the  
 25 same time they track the conditions of transportation resources. A solution was needed that allowed

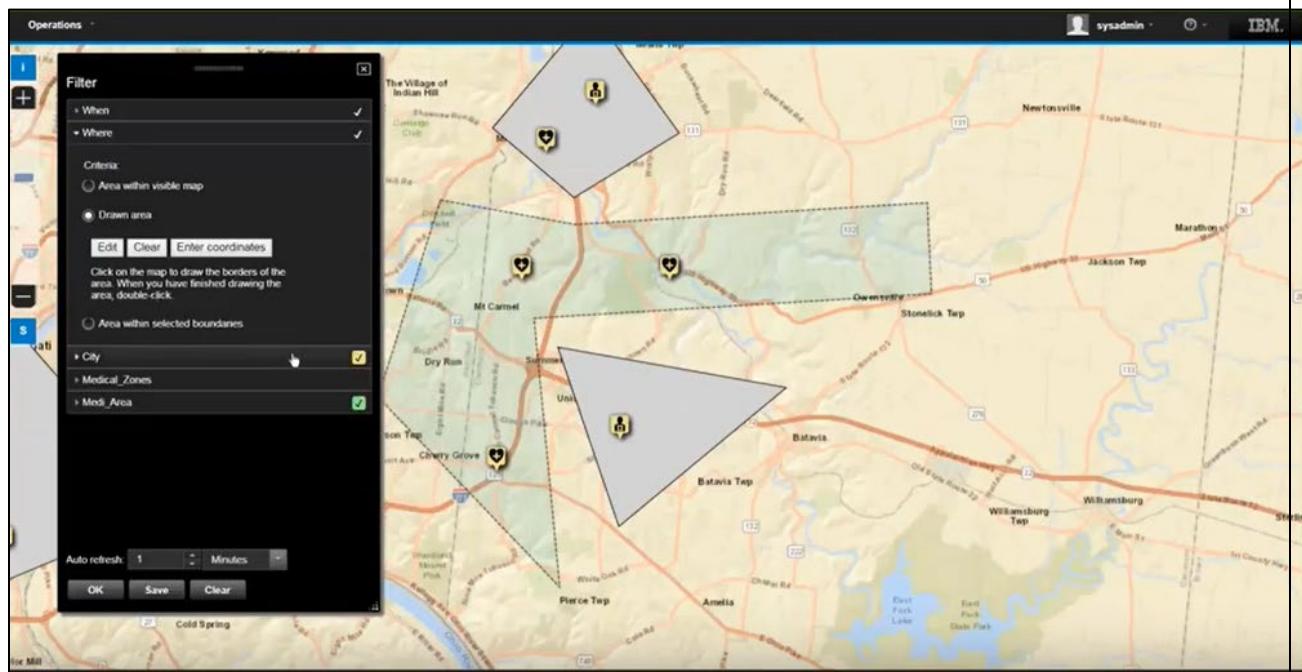
1 city personnel to make informed decisions by allowing them to interact with different types of  
 2 conditions in a uniform manner.

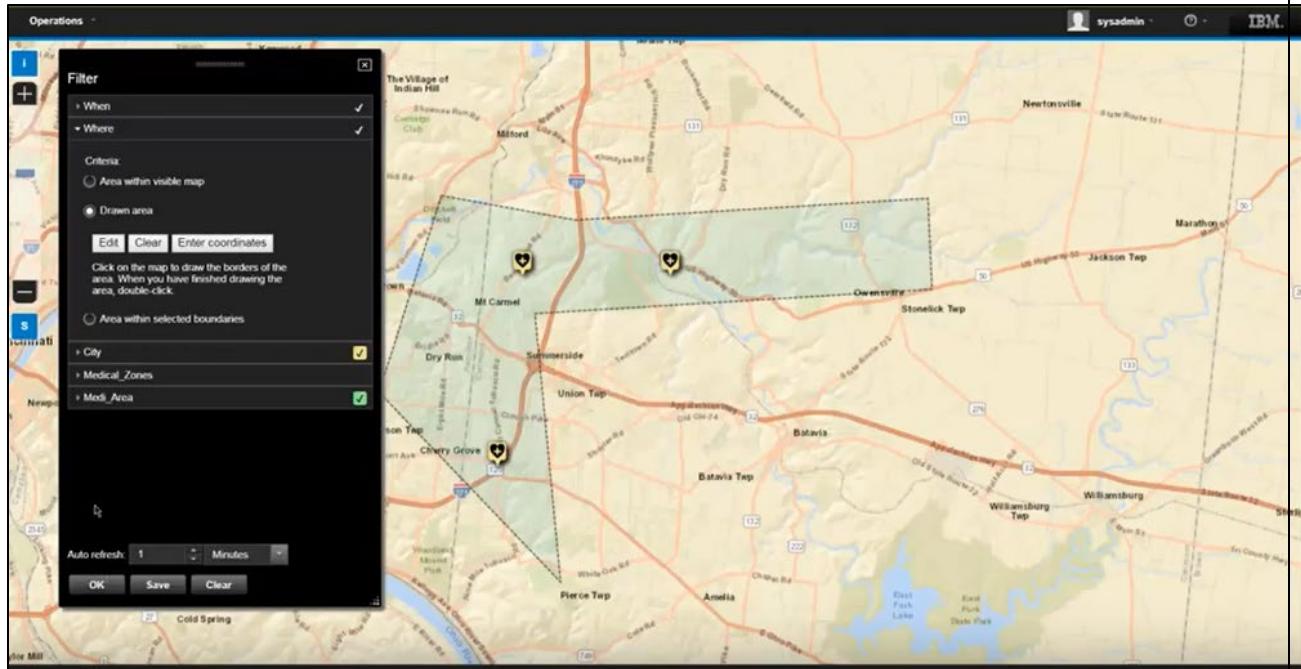
3       77. Specifically, personnel in a command center using IBM's IOC needed to focus on  
 4 results in specifically shaped regions so as to observe of events in specific neighborhoods. To  
 5 respond to these events, they needed to be able to update the results after visualizing geospatial  
 6 information, analyzing the information, and deselecting irrelevant results. But if a person's desired  
 7 geographical search area did not neatly conform to the designated square the map was displayed in,  
 8 they were presented with many irrelevant results, which could lead to frustration or wasted resources.  
 9 Particularly, if only a subset of search results were displayed on the map at a time, a user would have  
 10 to review every result to ensure they did not miss relevant results. Using the prior methods of  
 11 searching and filtering, a user would be forced to sort through results that did not fit their search  
 12 criteria, but were automatically returned because they fit within the map's dimensions on the screen.  
 13 In contrast, the '789 patent allowed a user to designate their own area of the map to search and to  
 14 select all of the results within that area for display to the user.

15       78. The inventors of the '789 patent achieved this innovative method of searching by  
 16 allowing for greater interactivity and the ability to select a customized area of the map display in  
 17 order to update the selection in both the map and list. Specifically, the inventors of the '789 patent  
 18 realized that a user could get more relevant search results if they were able to use input/output  
 19 devices to "draw 720 a selection area 400 in the viewing area 118 of the map display" using a user-  
 20 determined shape. '789 patent at 6:48-52; claim 8. The search results displayed on the map were  
 21 then filtered by "select[ing] elements 120 within the selection area 400" and "deselect[ting]"  
 22 "[e]lements 120 outside the selection area" according to the user-determined selection area, giving  
 23 users the ability to deselect the elements they were not interested in. *Id.* at 6:51-53. This  
 24 functionality was accomplished by the inventors of the '789 patent using an approach to filtering  
 25 based on deselection. Unlike highlighting an item on a map or highlighting a list item, which only

1 emphasized wanted results, the approach of the '789 patent deemphasized unwanted results by  
 2 deselecting elements outside of the user drawn selection area.

3 79. Further, by “synchroniz[ing] 710 the map display 116 and the list display 124 to  
 4 concurrently update the elements 120” so “that the changes are shown in both displays concurrently”  
 5 a user was presented with detailed information about the points of interest in the user-designated  
 6 area. *Id.* at 6:33-40. The invention was incorporated into IBM’s IOC and used by personnel in  
 7 command centers to aid their decision-making by allowing them to more finely filter their results  
 8 and hone in on the most relevant information.





Ex. 35 (From <https://www.youtube.com/watch?v=x3iHUNBkTDQ> at 00:56 and 00:58).

80. Before the invention of the '789 patent, personnel using IBM's IOC would have to rely on long-range predictions for trends and directions. Now, they can view real-time information on critical infrastructure and assets, such as medical facilities, public transportation, fire hydrants, and water treatment plants. The inventions of the '789 patent were successfully integrated into IBM's IOC and played an integral role in the success of this product. The novel technologies of the '789 patent greatly improved upon the prior art by allowing for multiple linked selection and filtering capabilities in the displays and bidirectional interaction between the list and map displays, regardless of the users' experience with different operating systems. This allowed users to more finely filter their search criteria and obtain more relevant results than prior art methods. The inventions of the '789 patent thus allow personnel to more effectively respond to events and to monitor assets and infrastructure using the claimed invention to deemphasize excess information.

81. The claims of the '789 patent have been recognized for its benefits and innovation through IBM IOC, which embodies the claims of the '789 patent. For example, a local official recognized that the city of South Bend, Indiana has had "huge measureable benefits" from "viewing

1 all our aggregated data in real-time” by using IBM IOC as part of its water management system.<sup>13</sup>  
 2 IBM IOC improved South Bend’s ability to predict the potential overflow of hazardous wastewater,  
 3 and helped the city avoid more than \$600,000 in potential government fines. To illustrate, when a  
 4 water utility specialist is flushing water hydrants to release iron or rust in South Bend, they can use  
 5 the IOC’s dashboard to monitor the combined sewer pipes and make adjustments as needed to avoid  
 6 a dry weather overflow violation. IBM IOC allowed South Bend to more quickly address and  
 7 prevent issues such as sewer overflows, flooding, and water quality, leading a local official to state  
 8 “we can … solve problems, that, until now, seemed insurmountable.”<sup>14</sup> For another example, IBM  
 9 IOC allowed traffic management professionals at the New Jersey Turnpike Authority to minimize  
 10 congestion and improve traffic flow. Professionals at the New Jersey Turnpike used IOC to access  
 11 a centralized command and control system, which enabled them to respond to real-time information  
 12 about roadway conditions from thousands of sensors.<sup>15</sup>

13       82.     Zillow touts the “Draw Your Own Search” feature on the Zillow website and mobile  
 14 applications as a technological innovation, despite the fact that appropriates the inventions of the  
 15 ’789 patent. According to Zillow, the “Draw Your Own Search” feature was developed during Hack  
 16 Week,<sup>16</sup> which Zillow touts as a “whirlwind of ideation, experimentation, [and] new projects” that  
 17 “provides employees with an opportunity to be creative” and to “work on projects that innovate on  
 18 our tools, products, and processes.”<sup>17</sup> Zillow also publicized that Hack Week “gives engineers time  
 19 to … help[] ensure [that] Zillow is using the best tools and technologies.”<sup>18</sup> Zillow’s employees  
 20 have recognized the benefits and innovation of the claims of the ’789 patent. The “Draw Your Own  
 21

22       <sup>13</sup> Ex. 80 (<https://newsroom.ibm.com/2012-06-27-IBM-Notre-Dame-Emnet-Help-South-Bend-Indiana-Protect-Public-Health-Reduce-Pollution-with-Smarter-Cities-Cloud-Analytics>) at 1.

23       <sup>14</sup> *Id.*

24       <sup>15</sup> Ex. 81 (<https://www-03.ibm.com/press/us/en/pressrelease/46962.wss>) at 1.

25       <sup>16</sup> Ex. 82 (<https://www.zillowgroup.com/news/winter-hack-week/>) at 1.

1       <sup>17</sup> Ex. 83 (<https://medium.com/zillow-tech-hub/zillow-hack-week-summer-2019-686dd2ecab18>) at 1.

18       <sup>18</sup> Ex. 82 at 1.

1 Search” feature was awarded by a panel of Zillow judges as one of the winners of Hack Week.<sup>19</sup>  
 2 Zillow advertises the “Draw Your Own Search” feature as “allow[ing] users to quickly and easily  
 3 draw the area they want to search on a map.”<sup>20</sup>

4       83.     In sum, the ’789 patent solves the problem of how to efficiently present geospatial  
 5 information on electronic device displays. It does so in a specific way: by providing an improved  
 6 graphical user interface displaying objects on a map and an associated list, and enabling users to  
 7 interact with and manipulate the display of these objects by drawing a free-form shape around  
 8 specific objects.

9       84.     The invention of the ’789 patent is not the only possible solutions to the need for  
 10 effectively presenting and manipulating data with geospatial characteristics on electronic device  
 11 displays. Alternatives existed as well, but lack some of the advantages of the invention. For  
 12 example, one approach is a list-driven process, where the system could first define what information  
 13 is in the list display and then update the map display in response to the selection in the list display.  
 14 But the list display does not allow users to visualize the geospatial characteristics of information in  
 15 the decision-making process. Consequently, technology using this approach limited how users could  
 16 interact with geospatial data. There are also alternatives to using a selection area in a user drawn  
 17 shape. For example, it was known that items could be selected by dragging a rectangular region  
 18 over a set of items. For another example, items can be selected with a specified particular criteria  
 19 for selection, inclusion, or exclusion through the use of query language. But these approaches did  
 20 not address the need for users, such as personnel in command centers, to take into account the non-  
 21 linearity of particular areas, such as irregularly shaped neighborhoods, or geospatial features like  
 22 rivers, water hydrants, and roads.<sup>21</sup>

23       19 Ex. 84 (<https://www.zillow.com/tech/hack-week-3/>) at 5.

24       20 Ex. 82 at 1.

25       21 For a more detailed discussion regarding the problems of visualizing and understanding large sets  
 26 of data on a computer display prior to the ’789 patent, solutions to those problems, and inventive  
 27 aspects related to the ’789 patent, *see* Ex. 85 (Declaration of Andrew Cockburn).

1           **H. IBM Invented Methods To Better Track Desperate Objects On Graphical User**  
 2           **Interfaces By Using Dynamic Layers To Simultaneously Display Multiple Object**  
 3           **Categories And Rearranging Those Layers In Response To User Requests.**

4           85.     At the time of the inventions of the '389 patent, the capabilities of computing devices  
 5     and networking equipment were being improved and developed at a rapid rate. At the same time,  
 6     systems that took advantage of these improvements were being implemented in all areas of industry.  
 7     These improved systems were often much more complex than their predecessors due to the  
 8     implementation of these new technologies. Examples of such complex systems include the  
 9     inventory of a company or store, the hardware and software components of large organizations, and  
 10    the employees of large municipalities. Although these complex systems could hold more data than  
 11    past simpler systems, the large amount of data in these systems meant that it was more complicated  
 12    to track and manage the operations of the system. In order to effectively oversee these systems,  
 13    users needed to be able to tell how each component functions in the system as a whole, how each  
 14    component is interrelated with other components, and how to holistically understand and visualize  
 15    the entire architecture of the system. A need to better monitor these systems arose.

16           86.     The inventors of the '389 patent developed the patented technologies as part of IBM's  
 17    efforts to improve technology for displaying information and objects in complex systems using a  
 18    graphical user interface. Due to the increasing complexity of the systems being developed, various  
 19    methods were used to improve visualization of the components of such systems. At the time of the  
 20    invention, data systems had fewer components, and thus visualization of the components based on  
 21    spatial positioning was sufficient. For example, U.S. Patent No. 5,500,934 (Ex. 36), filed in 1994,  
 22    discloses displaying objects of a LAN network by positioning the objects in defined locations. For  
 23    another example, U.S. Patent No. 6,005,578 (Ex. 37), filed in 1997, discloses grouping objects into  
 24    levels. Though such methods were adequate in those earlier years, by 2001, as systems continued  
 25    to grow in complexity and the number of objects comprising such systems increased, the use of these  
 26    methods became problematic. The volume of information and components of these new systems  
 27    made it difficult to organize and present information on a computer's two dimensional screen using

1 existing methods in a way that was both comprehensive and understandable. In particular, using  
 2 such methods to display all of the information or components at once resulted in an overly cluttered  
 3 display with various objects overlapping each other. This made it difficult, if not impossible, to  
 4 determine the relevant details of and relationships between the information that a user was attempting  
 5 to view.

6       87.    Additionally, complex systems also started to be comprised of more categories of  
 7 objects. As an example, an organization can be comprised of several computing devices, such as  
 8 personal computers and servers, various peripheral devices, such as printers and routers, and various  
 9 types of software, such as application software and middleware software. A user managing such a  
 10 system needed to be able to identify and view these various categories of objects to understand how  
 11 the various parts of the system interact together to diagnose any issues or deficiencies that may be  
 12 present. However, the cluttering and overlapping of objects in existing methods for displaying such  
 13 information made it impossible to decipher the relationships between the various pieces of  
 14 information and components. Moreover, the computer systems were unable to independently  
 15 determine the categories and apply the differences. Thus, there was a need in the prior art to be able  
 16 to display, on a two dimensional computer screen, a large amount of information in a manner that  
 17 allowed a user to seamlessly distinguish and navigate between various groups of related information  
 so that users can effectively monitor and manage their system.

18       88.    The IBM Tivoli team recognized the difficulties businesses dealt with in trying to  
 19 monitor and manage their business systems due to the increasing level of complexity and the  
 20 increasing number of resources comprising the systems. The Tivoli team thus sought to develop the  
 21 Tivoli Global Enterprise Manager (“GEM”) in order to provide their business clients with an all-  
 22 inclusive solution for managing all aspects of their clients’ business environment. The most  
 23 pertinent problem identified by the Tivoli team was the users’ inability to understand their business  
 24 system as a whole. Because of the vast number of resources and interdependencies between such  
 25 resources, businesses needed a solution to be able to distinguish between each of these various

1 resources and to be able to easily comprehend how these resources interact. The inventions of the  
 2 '389 patent resolve these problems by disclosing a method that allows for effective monitoring of  
 3 the objects of the system even where the display of the objects are clustered and overlapping one  
 4 another by grouping objects of a category into layers, applying non-spatially distinguishable display  
 5 attributes to the objects of these layers, and applying a display emphasis on prioritized layers.  
 6 Though the solution was ultimately not included in the commercialized version of the GEM due to  
 7 the timing of the development of this feature, the inventors foresaw that the need for the inventions  
 8 of the '389 patent existed at the time of the invention and would continue to exist from that point  
 9 forward due to the inevitably increasing complexities of all systems.

10 89. Prior art methods grouped objects without effectively distinguishing groups of  
 11 objects in a useful way. The inventors of the '389 patent, noting that using prior art methods on  
 12 these complex systems would lead to an incomprehensible display of overlapping and cluttered  
 13 objects, developed an innovative method that accounts for the cluttered display by “using non-  
 14 spatially distinguishable display attributes, such as color hues, color values, color saturation, size,  
 15 three dimensional images, animation, shading, fill patterns, line patterns, line weights, opaqueness,  
 16 transparency, shape, and shape anomaly.” '389 patent at 6:7-10. The use of such attributes allows  
 17 a user to still see the groupings of objects that the user desires even when they are cluttered with  
 18 other objects by visually distinguishing these objects. *See id.* at 4:17-22. Figure 1. Thus, for  
 19 example, if a red hue is applied to the objects of the layer, the “color (hue) can be used to distinguish  
 20 one layer from another” even where there are thousands of other objects on display. *Id.* at 5:23-26.  
 21 Additionally, the patent discloses a method allowing a user to rearrange the various layers to allow  
 22 the user to effectively monitor their system with different points of view. In particular, the patent  
 23 explains that “[t]he user can re-layer the categories so that the category of objects displayed in one  
 24 layer are moved to another layer.” *Id.* at 2:61-63. For example, in a hotel inventory management  
 25 system, the user may want to view layers of hotels based on their star rating. If the user then elects  
 to view layers of hotels based on their location, the patent discloses a method wherein the hotels are

1 re-matched to a different layer based on location, and a different non-spatially distinguishable  
 2 display attribute is then applied to the hotels of each of these new layers.

3 90. The methods in existence at the time of the invention also did not include the  
 4 implementation of applying a display emphasis to visually distinguish between layers in the way  
 5 claimed by the inventors. Because systems had fewer objects when the prior art methods were  
 6 developed, there was no need to distinguish between layers. It was sufficient to group together the  
 7 objects and allow a user to navigate between these groups. However, as the number of objects in a  
 8 system increased, merely navigating between spatially-separated groups of objects was insufficient  
 9 for focusing on one group over another because of insufficient space on a screen to allow for a  
 10 feasible display of these groups. Therefore, not only did the inventors introduce the use of non-  
 11 spatially distinguishable display attributes to represent various layers, the inventors also disclosed  
 12 the implementation of a display emphasis between layers so that users could readily focus on a  
 13 specific layer. The patent explains that “one view can display the category of hardware objects in a  
 14 first, or most emphasized layer and a display of the category of software objects in a second, less  
 15 emphasized, layer.” *Id.* at 2:64-66. The application of a display emphasis allows one layer to be  
 16 emphasized over the other layers, such as by overlapping the focused layer over the others or by  
 17 saturating the color of that focused layer, so that the user can easily view the layer that is prioritized.  
 18 Additionally, the invention discloses reapplying the display emphasis when the layers are reordered.  
 19 *See id.* at 2:66-3:5. This allows the user to navigate between layers by emphasizing the newly  
 20 prioritized layer over the other layers. The addition of a display emphasis thus enables users to view  
 the layers in a particular order.

21 91. In sum, the '389 patent solves the problem of how to visualize a complex dataset  
 22 where there are too many objects to clearly display at the same time on a computer screen. It does  
 23 so in a specific way: by organizing those objects based on like characteristics and distributing them  
 24 into distinct adaptable layers, such that objects are visually distinguished not based on where they  
 25 appear but based on the layer in which they appear, thus allowing user to better understand cross

1 sections of the data or re-arrange the layers to further explore the dataset, without being overwhelmed  
2 by the sheer amount of relevant information.

3        92. The inventions of the '389 patent are not the only possible solution to the need for  
4 effective display of a large number of objects. Other solutions existed as well, but lack some of the  
5 advantages of the invention. For example, the display technology used by Yelp allows the user to  
6 select a single category of objects at a time and displays only the objects of that category on their  
7 map.

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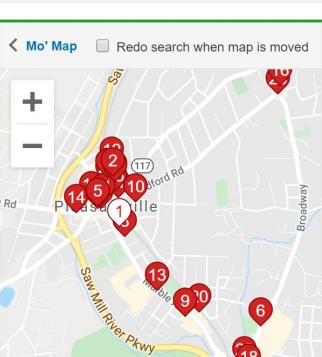
**1. Southern Table Kitchen & Bar** (914) 618-3355  
 210 reviews  
39 Marble Ave  
\$ - Southern

"This place has a refreshing take on a menu. I have been there twice for business lunches and Melanie is the friendliest and more professional waitress I have..." [read more](#)



**2. Fatt Root** (914) 579-2552  
 14 reviews  
11 Wheeler Ave  
\$ - Asian Fusion  


"We were on our way home from Bear Mountain, tired and hungry. While I drove my girlfriend was scrolling Yelp looking for a place for a quick bite. Nothing..." [read more](#)



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(Ad) We Offer Sandwiches, Soups, Burgers and Pork Chops. View Our Menu. Catering Available. Open Tuesday To Sunday. Private Room. Categories: Dinner Menu, Lunch Menu.

Ex. 38 (<https://www.yelp.com/search?>

find desc=Restaurants&find loc=Pleasantville%2CNY).

SECOND AMENDED COMPLAINT FOR PATENT  
INFRINGEMENT - 39  
Case No. 2:20-cv-00851-TSZ

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Ex. 39 ([https://www.yelp.com/search?find\\_desc=Bars&find\\_loc=Pleasantville%2C%20NY](https://www.yelp.com/search?find_desc=Bars&find_loc=Pleasantville%2C%20NY)).

93. Though this method ultimately allows a user to view the objects within the inventory of Yelp by viewing each category separately, it fails to include the use of displaying layers wherein the objects of each layer are displayed using non-spatially distinguishable display attributes. The use of layers allows a user to see the various objects of the system at one time to provide the user with a better understanding of the various objects present in the system. In the case of Yelp, using the inventions of the '389 patent would provide a user a better understanding of the composition of establishments in the town and the total number of options that a user can consider to plan out the user's itinerary.

94. Another alternative solution was invented by Robert Uthe, one of the co-inventors of the '389 patent, and disclosed in U.S. Patent No. 10,250,454 (Ex. 40, "the '454 patent"). The '454

1 patent teaches grouping all the objects with a selected attribute into a single subgroup represented  
 2 by a display element shown on the computer screen. The user can select this display element to view  
 3 information common to all the objects of that subgroup. Although the '454 patent does teach a  
 4 particular solution for displaying the numerous components of a system, the '389 patent's invention  
 5 includes additional advantages. In particular, the use of layers allows a user to visually understand  
 6 the number of components each layer is comprised of and also allows a user to select a specific  
 7 object of a layer as opposed to having to select the entire set of objects.<sup>22</sup>

8 **I. IBM Invented Unconventional Methods For Targeting Users With Highly Relevant  
 9 Advertising By Leveraging The Characteristics Of Search Results Rather Than  
 Merely Matching Search Queries.**

10 95. The inventors of the '443 patent developed the patented technologies as part of IBM's  
 11 efforts to improve Internet search engine technology in the area of e-commerce solutions and, in  
 12 particular, targeted advertisements. Prior to the inventions of the '443 patent, with the accelerated  
 13 growth of the Internet and its associated e-commerce activities, advertising over the Internet became  
 14 increasingly more acceptable to Internet users, and marketing professionals looked for ways to  
 15 optimize online advertising. But the technology used to deliver targeted advertisements to Internet  
 16 users presented unique challenges—different from those faced by offline advertising (such as  
 17 person-to-person marketing)—because computers must determine appropriate ads based largely on  
 18 the users' behaviors while browsing the Internet.

19 96. One prior art solution to the challenges faced by internet advertisers involved building  
 20 user profiles with cookies to generate banners ads. Internet advertisers built a user profile by  
 21 extracting data about the user from the user's browsing behaviors. When the user browsed a  
 22 particular website, the website placed on the user's computer a small piece of data (a "cookie") from  
 23 the user's browsing session on that website. When the user returned to that website, the website

24 25 <sup>22</sup> For a more detailed discussion regarding the problems of visualizing and understanding large sets  
 of data on a computer display prior to the '389 patent, solutions to those problems, and inventive  
 aspects related to the '389 patent, *see Ex. 85* (Declaration of Andrew Cockburn).

1 retrieved the cookies associated with that user to determine the user's interests. These cookies  
 2 comprised the user's "user profile"—a snapshot of the user's interests derived from their browsing  
 3 behaviors. For example, a user might visit the website [www.sears.com](http://www.sears.com) looking for a dishwasher.  
 4 The website stored a cookie on the user's computer indicating that the user is interested in  
 5 dishwashers. If the user later returned to [www.sears.com](http://www.sears.com), the website retrieved the cookie from the  
 6 user's computer and determined that the user was interested in dishwashers.

7       97. At the time of the invention of the '443 patent, advertisers typically used cookies to  
 8 build user profiles. The advertisers then used those user profiles to generate banner ads. Banner ads  
 9 are advertisements embedded into a website, typically appearing on a site as a bar, column, or box.  
 10 An early banner ad is seen in the image below:



11  
 12       13 Ex. 41 (<https://www.theatlantic.com/technology/archive/2017/04/the-first-ever-banner-ad-on-the-web/523728/>).

14       98. Advertisers presented banner ads according to the user's user profile, on the  
 15 assumption that the user profile accurately represented the user's interests. For example, a user  
 16 might have a user profile indicating that they are interested in dishwashers. When the user visited  
 17 [www.sears.com](http://www.sears.com), the website detected this attribute in the user's user profile and presented a banner  
 18 ad on the website advertising dishwashers.

19       99. Although user profiling and banner ads were a popular form of internet advertising  
 20 at the time of the invention of the '443 patent, they suffered from numerous drawbacks. A website  
 21 displayed banner ads to a user whether or not the user solicited them, which annoyed users who did  
 22 not want to see any ads or who preferred to view ads only if the user requested them. User profiling  
 23 was also burdensome and time-consuming to carry-out, especially for website owners who were not  
 24

1 tech savvy or lacked the required resources. Moreover, user profiling and banner ads were typically  
 2 only effective on websites that had high user traffic, since building comprehensive and informative  
 3 user profiles required extensive interactions with the website from lots of users.

4       100. Additionally, user profiling and banner ads were often not aligned with the user's  
 5 actual interests. For example, a user might visit [www.sears.com](http://www.sears.com) and search for a dishwasher. The  
 6 website stored a cookie indicating that the user is interested in dishwashers. The user then left the  
 7 website and purchased a dishwasher in-person from a different store. When the user returned to  
 8 [www.sears.com](http://www.sears.com) in search of an air conditioner, the website retrieved the user's cookie and  
 9 mistakenly concluded that the user is still interested in a dishwasher. Advertisers therefore had  
 10 difficulty keeping user profiles and banner ads aligned to a user's current interests. User profiling  
 11 and banner ads also failed to account for offline purchases and untracked online purchases. For  
 12 example, the website could not determine if a user bought a particular product in-person at a store,  
 13 disabled cookies on their browser before making a purchase, or simply chose to browse  
 14 anonymously.

15       101. The inventors of the '443 patent developed a novel and unconventional approach to  
 16 delivering advertisements over the Internet that overcame the limitations of user profiling and banner  
 17 advertisements. The inventors' core philosophy was at odds with the banner advertisements that  
 18 were prevalent at the time of the invention of the '443 patent. The '443 patent explains that "unlike  
 19 the prior art methods of selecting and displaying banner ads predicated on user profiles, these profiles  
 20 need not be relied upon. Instead the initial search results themselves are utilized." '443 patent at  
 21 5:16-19. The patent goes on to state that "[t]he invention's philosophy relies on the principle that  
 22 users who are performing a search query have a special interest in finding a particular piece of  
 23 information. From this one may deduce that if a user is interested in a specific piece of information,  
 24 he or she may be interested in related or similar advertisements." *Id.* at 5:11-16. The patent describes  
 25 the patented invention as "a new method and apparatus for associating search result items with

1 similar or related advertisements.” *Id.* at 2:63-65. The core idea behind the ’443 patent was therefore  
 2 an unconventional departure from the conventional internet advertising techniques of user profiling  
 3 and banner advertisements.

4       102. The patent describes the unconventional technique of generating internet  
 5 advertisements based off the results of a user search. First, a user performs a search. If the search  
 6 returns a search result, the system performs a search for related advertisements using that search  
 7 result. For example, a user may search “washer machine” and get three search results, named  
 8 WashMax, CleanMaster, and HousePro. The system could use the information contained in the  
 9 “WashMax” search result to search for advertisements related to that particular search result. The  
 10 system could repeat the advertisement search for both the CleanMaster and HousePro search results.

11       103. The system can also place a Graphical User Interface (“GUI”) button next to each  
 12 search result. If the user clicks a search result, the system returns information for that search result.  
 13 On the other hand, if the user selects the GUI button next to the search result, the system initiates a  
 14 search of the advertised database using the search result as a search parameter, and displays to the  
 15 user advertisements relating to that search result.

16       104. The ’443 patent describes a detailed algorithm for performing this unconventional  
 17 method of delivering internet advertisements based on search result items in a computing  
 18 environment. First, a “user initially submits a query” which is then “forwarded to the user/session  
 19 manager subsystem [] which then forwards it on to [the] search engine.” *Id.* at 6:27-31. The “search  
 20 engine [] performs an Internet search and produces a search results set” which is then “forwarded []  
 21 to the product matching manager.” *Id.* at 6:31-34. “The product matching manager [] takes the  
 22 search engine results set and attempts to match at least one product to each of the search result items”  
 23 by “communicat[ing] with the product database.” *Id.* at 6:35-38. Then, “[f]or each match found,  
 24 the product matching manager [] flags the corresponding search result item” and “this flag is used  
 25 by the request server . . . to display a graphical user interface [‘GUI’] designator.” *Id.* at 6:49-54.

1 After that, “[t]he request server [] builds a results page which contains the search result items, and if  
 2 the search result item was flagged as [] having a product match, a [] graphical user interface [‘GUI’]  
 3 designator is also displayed for subsequent user selection. The search result items and associated  
 4 product icons are then displayed [] to the browser.” *Id.* at 7:11-17.

5       105. The ’443 patent also describes how the computer-specific process of caching is used  
 6 to implement in an inventive way the unconventional method of delivering associated  
 7 advertisements based on search result items. The ’443 patent states that a “caching component []  
 8 may be used to expedite the matching process.” *Id.* at 6:44-45. The ’443 patent further explains that  
 9 “[t]his additional caching component stores frequent advertising queries, using the URL of the  
 10 search result item as a unique key identifier.” 6:47-49. The patent recognizes that a computer has  
 11 limited time and resources to retrieve information, and presents an unconventional method of using  
 12 caching to search for advertisements using the search result items in a time and resource-efficient  
 13 manner. The patent explains that “performance of the implementation is time sensitive”, and  
 14 therefore “the complete product list is not associated with each search result item [immediately],”  
 15 but instead “[t]he caching component may be adapted to yield a TRUE or FALSE designation to the  
 16 user depending on whether related advertisements exist for the URL of a particular search result  
 17 item.” *Id.* at 6:54-60. The ’443 patent goes on to explain that “[e]very result for an advertisement  
 18 is stored in the caching component. Advertising queries issued from the product matching manager  
 19 [] perform a first inquiry in the caching component database, and then a full advertising query if no  
 20 information is found in the caching component database for the particular search result item.” *Id.* at  
 21 6:60-65. The invention therefore applies caching in an inventive way to improve the delivery of  
 22 advertisements over the internet within a computer context.

23       106. The ’443 patent also describes how the invention uses the computer-specific  
 24 technique of “batch processing” in an inventive way to implement the unconventional method of  
 25 delivering advertisements related to search result items over the Internet. The patent explains that

1 “the product matching manager [] may be adapted to perform an off-line batch process for each  
 2 search result item in the search engine repository. The product database [] and the search engine  
 3 repository are synchronized for this alternative approach. For example, for any new product  
 4 advertisements, the product matching manager would update the cache.” *Id.* at 6:66-7:5. The  
 5 invention therefore applies batch processing in an inventive way to improve the delivery of  
 6 advertisements over the internet within a computer context.

7 107. The '443 patent further describes how the unconventional method of delivering  
 8 advertisements associated with search result items improves internet advertising. The patent states  
 9 that “the implementation of this methodology will establish a new avenue for generating revenue  
 10 from Internet advertisements.” *Id.* at 1:65-67. Unlike user profiling and banner advertisements,  
 11 generating advertisements based on the search result items themselves gives any website—no matter  
 12 how small or infrequently visited—the ability to generate advertisements and ad revenue as long as  
 13 the website has some type of search engine. As the '443 patent states: “[U]nlike the current user  
 14 profiling methods, all web site owners who provide search engine services will be able [to] make  
 15 use of the instant invention, independent of whether user profiling information can be obtained.” *Id.*  
 16 at 2:1-4.

17 108. The invention also more closely aligns the advertisements with the user’s interests,  
 18 since unlike user profiles, “search results provide a more narrowly defined basis for selecting target  
 19 advertisements for each user.” *Id.* at 5:20-21. Internet advertisers no longer have to rely on  
 20 potentially outdated user profiles to generate unsolicited banner ads that may not even reflect the  
 21 interests of the user. Instead, internet advertisers can use the unconventional methods of the '443  
 22 patent to find relevant advertisements for a particular user by using search result items returned to  
 23 the user through a user-initiated search. Therefore, the systems and methods of the '443 patent are  
 24 novel and unconventional.

25

1       **J. IBM Invented Methods For Improving Computer-Generated Promotions By Creating**  
 2       **Special-Purpose Promotion Templates And Instances That Could Be Modified,**  
 3       **Combined, And Filtered To Achieve Highly Tailored Promotion Campaigns.**

4       109. The inventors of the '904 patent developed the patented technologies to improve how  
 5       promotions were generated and how they were subsequently managed, organized, and distributed.

6       At the time of the inventions of the '904 patent, increases in computer power and network speeds  
 7       increased the number and complexity of online advertising. Marketers became increasingly  
 8       interested in personalized advertising because such advertising had a higher conversion rate—the  
 9       rate at which recipients would purchase products and services. At the same time, customers came  
 10      to expect advertisements to be tailored to their particular interests and circumstances.

11       110. In the prior art, marketers used a top-down system in order to create and distribute  
 12      promotions. Marketers would create a small number of standardized promotions and query a  
 13      database for potential customers with particular attributes to find a group of targets who would  
 14      receive the promotions. Marketers could modify basic information by completing fields in the  
 15      standardized promotions, much like completing a form when going to the doctor's office. For  
 16      example, marketers could use "mail merge" functionality to insert the customer's name, email,  
 17      physical address, and other characteristics into preset fields on preexisting promotions. Using the  
 18      mail merge technique, marketers could create the impression of personalized advertising—as long  
 19      as the number of promotions remained manageable. Zillow relied on such a mail merge system in a  
 20      PTAB petition it filed to challenge the patentability of the '904 patent.<sup>23</sup> That system differs from  
 21      the claimed inventions in several important ways.<sup>24</sup>

22       111. While the mail merge process was sufficient for basic marketing purposes, it created  
 23      challenges for generating and keeping track of the various promotions and failed to offer valuable

24       <sup>23</sup> See Ex. 86 (*Zillow Group, Inc. v. International Business Machines Corp.*, IPR2020-01656, Ex. 1003 (PTAB Sept. 18, 2020)) at [0098], [0567], Figure 1.

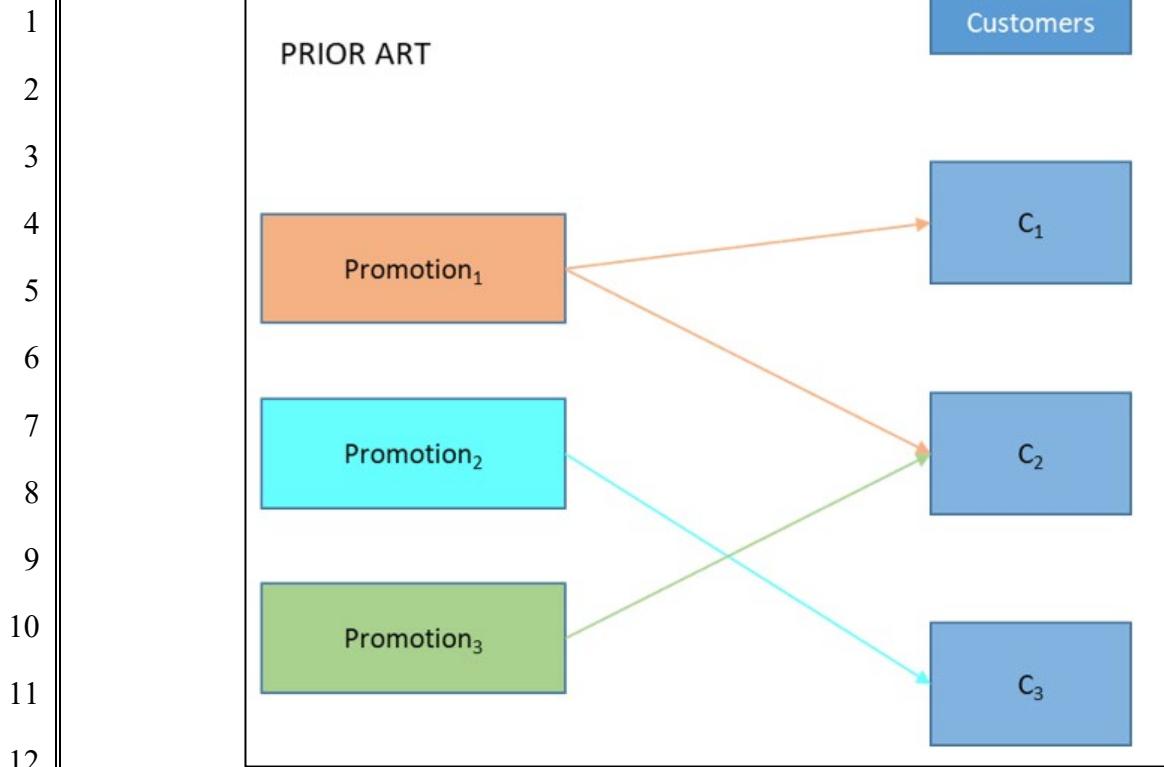
25       <sup>24</sup> See Ex. 87 (*Zillow Group, Inc. v. International Business Machines Corp.*, IPR2020-01656, Paper 006).

1 analytics for improving future marketing campaigns. As the marketers increasingly encountered  
2 potential customers online, the number of potential promotions could reach into the thousands.  
3 Individually creating each promotion was time consuming and resource intensive. Further,  
4 marketers could not use the simple mail merge process of combining text or graphics to create highly  
5 personalized promotions. Therefore, marketers had to settle for sending very similar promotions to  
6 large groups of targets. Not only would this hurt the relevancy of the promotion to each target, it  
7 was also possible that the information would be outdated by the time the promotion had been created  
8 and delivered.

9       112. Finding the appropriate promotions, organizing them, and getting those promotions  
10 to the right customers presented another problem. If marketers sent a promotion to small target  
11 groups, it was difficult to track the effectiveness of the promotion over a meaningful number of  
12 potential customers. If marketers sent a promotion to large target groups, it was difficult to create  
13 highly personalized promotions. Therefore a need arose to create promotions efficiently, while  
14 grouping related promotions together so they could then be provided to a larger number of customers.

15       113. As illustrated below, promotions in the prior art were distributed by first being  
16 generated by a user, after which the promotion was sent to a customer or customers deemed to be  
17 part of the relevant customer base for each respective promotion. In this one-way process of  
18 distributing promotions, information was only received from the consumers after the promotions  
19 were already sent.

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114. The inventors of the '904 patent addressed those needs using a new method of  
 14 creating and distributing promotions that utilized a bottom-up strategy, in contrast to the top-down  
 15 style of the prior art. This invention leveraged unconventional promotion templates that could  
 16 dynamically create individual promotions and individual promotion lists. Using the claimed  
 17 promotion templates, the inventors were able to create collections of promotion instances and  
 18 promotion versions. These collections, called promotion lists, could be distributed to customers and  
 19 used, for example, as individualized promotion campaigns. To achieve this result, the inventors  
 20 designed promotion templates that could repeatedly produce other promotion templates, promotion  
 21 instances, or promotion versions based upon specific parameters determined by the user of the  
 22 marketing system. Users could more easily store, manipulate, and distribute the promotions by  
 23 creating a promotion list populated by relevant promotions, generated through the use of one or more  
 24 promotion templates.

1       115. Promotion templates are able to create replicable promotions because they may  
 2 include both preassigned attributes, which will define the resulting promotion and are likely to be  
 3 used across templates, and custom attributes, which may be unique to a specific template or group  
 4 of templates. The latter can be implemented using parameterized fields for which users can change  
 5 the values. For example, if a user wants to generate promotions for specific flights, the attribute  
 6 fields “FavoriteTrips.From” and “FavoriteTrips.To” could be populated with the values “Boston”  
 7 and “New York,” respectively, for a customer interested in traveling between those two cities. In  
 8 this way a user can now generate countless promotion instances or versions which advertise the price  
 9 of trips from Boston to New York for different dates and different price-points all produced by the  
 10 same template. If another customer often travels between Atlanta to San Diego, this same template  
 11 could generate promotions to advertise flights on this route to that specific customer. Thus, a single  
 12 flights-specific template can be repeatedly used in different scenarios. This made it possible for the  
 13 first time to create a massive promotion database, which could be easily queried and sent to potential  
 14 customers.

15       116. Further, the innovative methods of the ’904 patent allowed those promotions to be  
 16 further individualized in specific promotion lists responsive to the user’s search query. Following  
 17 from the previous example, a customer who is traveling from Boston to New York might be shown  
 18 a promotion list that includes promotions for hotels in New York, promotions for activities in New  
 19 York, as well as promotions for flights from Boston to New York, all created from different  
 20 promotion templates.

21       117. The creation of promotion instances from a promotion template is only one of the  
 22 inventive aspect of the claimed invention. The ’904 patent also drastically changed how the  
 23 promotions that had been created were then *distributed*. For example, the inventors claimed an  
 24 algorithm comprising a series of steps that allows for flexibility *after* promotion instances have been  
 25 generated. Those steps addressed the need for finding and delivering appropriate and relevant

1 promotions from a large number of promotion instances that may have been generated from  
 2 promotion templates. The inventors of the '904 patent also recognized that the same target customer  
 3 may need to receive multiple promotion instances. By leveraging information about a target  
 4 recipient, such as using a search query that the recipient itself had generated, a collection of highly  
 5 relevant promotion instances could be delivered to increase the effectiveness of the marketing  
 6 campaign.

7       118. ***First***, to offer a customized high-level “filtering” of the promotion instances which  
 8 were previously generated by a promotion template, the inventors conceived of a system that  
 9 received “a search query that includes one or more attributes of a promotion instance.” '904 patent  
 10 at 24:54-55. For instance, a user could submit a search query utilizing Boolean operators to limit  
 11 the results to exactly what that user was looking for. *Id.* at 16:66-17:12 (“The ‘AND’ is an example  
 12 of using a search term that is a Boolean operator to cause the process to include both ‘rkennedy’ and  
 13 ‘Email’ as search criteria 374.”). By leveraging these highly specific attributes in the search query,  
 14 the invention enabled searching for promotion instances that would reflect the interest of the target  
 15 recipient and in response, return a list of highly relevant promotion instances.

16       119. ***Second***, once the search query is received, the inventions include “searching one or  
 17 more data repositories for promotion instances having attributes corresponding to the attributes  
 18 specified in the search query.” *Id.* at Claim 1. This search identified promotion instances relevant  
 19 to the target recipient by searching for and, in a later step, returning a list of promotion instances that  
 20 have similar attributes to the search query. Because promotion instances are being searched for and  
 21 narrowed based on a user query, as opposed to being sent out across an entire field of potential  
 22 targets, the potential customers receive more tailored promotions and marketers get more accurate  
 23 results and feedback.

24       120. ***Third***, the inventors of the '904 patent further recognized that additional “filtering,”  
 25 such as filtering out promotion instances that a user may not want to view or that are outdated, can

1 be carried out to select an even more relevant collection of promotion instances for delivery to the  
 2 target recipient. Specifically, the '904 patent teaches "receiving, by the one or more computers, a  
 3 selection of one or more promotion instances, from the returned list, to be included in the promotion  
 4 list." *Id.* at Claim 1. In other words, the inventors contemplated refining the list of promotion  
 5 instances matching the query to even more finely tailor the promotion instances delivered to the  
 6 target audience. *Id.* at 17:20-39 ("For example, suppose the user wishes to query all promotion  
 7 instances for gold credit cards, but only wants the promotion instance for the gold credit card with  
 8 the lowest interest rate. Thus, if the user sorts 378 results of promotion instances for gold credit  
 9 cards in ascending order by interest rate, and limits 380 the results to the first hit, then the user can  
 10 find, the promotion instance for a gold credit card with the lowest interest rate."), Figure 18. This  
 11 tailoring of promotion instances was a drastic departure from the prior art "wait and see" approach.  
 12 Rather than sending the same promotion to everyone in a target group and waiting to analyze  
 13 feedback on that promotion, promotions could be targeted based upon the user's search query, even  
 14 before the promotions have been distributed.

15       121. ***Fourth***, the patented invention taught assigning this tailored set of promotion  
 16 instances to a "promotion list," which is a ***collection*** of one or more promotion instances that may  
 17 be delivered to the desired target recipient. *Id.* at 16:17-20 ("A promotion list is a collection of one  
 18 or more promotion instances and can be used where ever individual promotion instances are used.").  
 19 By utilizing promotion lists instead of sending out a singular promotion, the '904 patent allowed for  
 20 tailored collections of promotions to be sent to targets. This not only increased the analytical  
 21 possibilities by providing the ability to analyze each promotion in a collection, but it also increased  
 22 the possible number of relevant promotions that could be presented to a target at one time.

23       122. ***Fifth***, the inventors conceived of promotion codes that could track target responses,  
 24 offering insight previously unavailable to marketers. By tracking each promotion instance with a  
 25 promotion code, the marketer could determine which specific promotion created a response from the

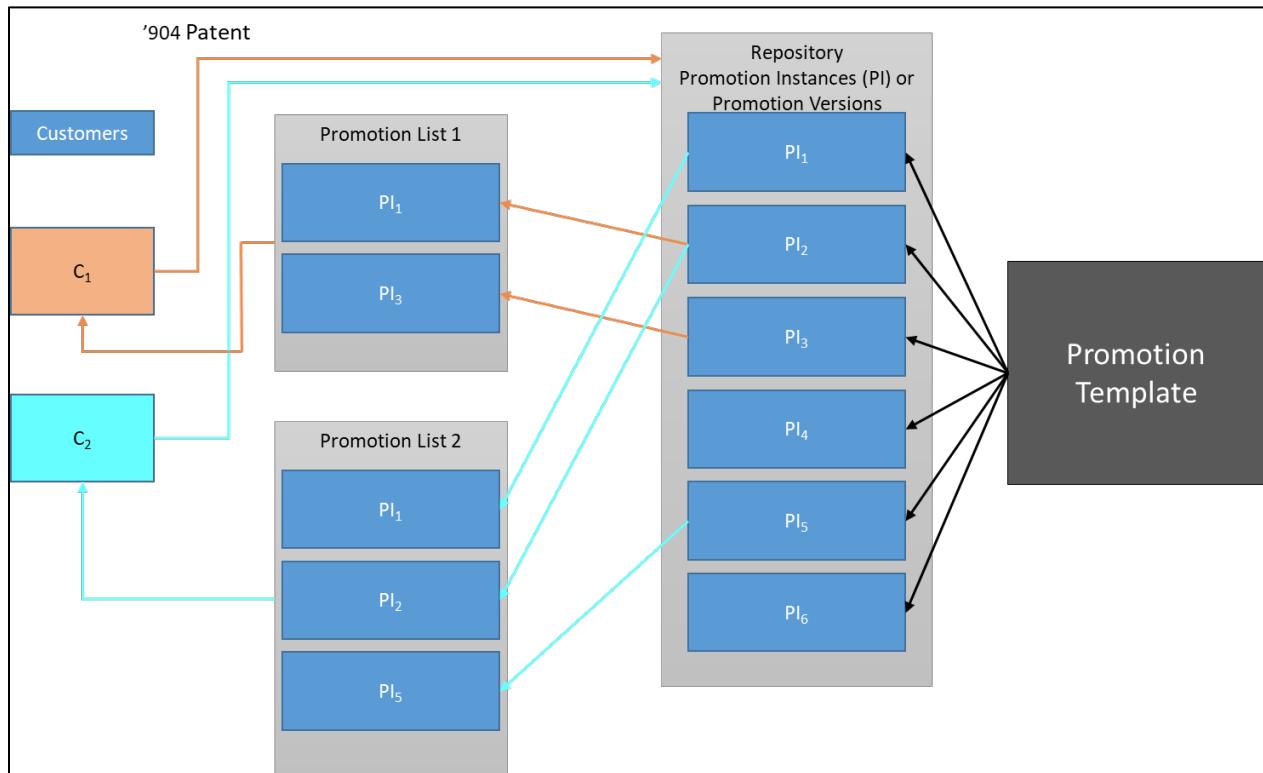
1 target, regardless of how many promotions that target received, and could therefore understand  
 2 which promotions were most effective. Promotion codes allowed marketing campaigns to be more  
 3 effective by enabling marketers to push the use of the most effective promotions. The subsequent  
 4 promotion lists could then comprised of only the most efficient promotion instances. This process  
 5 could iteratively run throughout the promotion management campaign, constantly creating  
 6 promotion lists for targets with the most efficient and relevant promotions. The patented invention  
 7 thus enabled marketers to receive feedback and analyze data while campaigns are running so they  
 8 can better allocate resources and redirect the campaign if needed.<sup>25</sup> This added flexibility and  
 9 allowed campaigns to be more agile, all while saving money and company resources and further  
 10 allowed for automation of some of the analytics for increased efficiency and accuracy.<sup>26</sup> These  
 11 improvements are made possible through the use of promotion templates generating promotion  
 12 instances and the utilization of promotion codes.

13       123. All of these improvements over the prior art allowed for a more efficient and effective  
 14 method of the creation and subsequent distribution of promotions. Compared to the “PRIOR ART”  
 15 figure above, the figure below illustrates at a high level how the ability to generate a large repository  
 16 of promotion instances combines with other inventive aspects of the ’904 patent to timely deliver  
 17 relevant promotion instances. As discussed, these promotion instances can be assigned to promotion  
 18 lists to distribute the most relevant promotions in the most efficient way possible to the targets. The  
 19 inventors were thus able to generate a dynamic promotion list that could be updated, without user  
 20 intervention, to reflect any changes in promotion instances by using a query that dynamically  
 21 returned promotion instances that matched the query. By reversing the direction of the previously  
 22

23       <sup>25</sup> Ex. 88 (Colin Beasty, *Affinium 7: Unica’s Authoritative Solution*, destinationCRM.com (Sept. 14,  
 24 2006), <https://www.destinationcrm.com/Articles/CRM-News/CRM-Featured-Articles/Affinium-7-Unicas-Authoritative-Solution-42515.aspx>) at 2.

25       <sup>26</sup> Ex. 89 (*Unica(R) Rolls Out New Version of Its Enterprise Marketing Management Suite*, CRM  
 26 Directory (September 15, 2006), <http://www.crmdirctory.com/unicar-rolls-out-new-version-of-its-enterprise-marketing-management-suite/>) at 2.

1 one-way analysis of marketing campaigns, the '904 patent greatly benefitted marketers and targets  
 2 alike by allowing for massive improvements in promotion distribution.



#### 16 **K. Zillow Has Built Its Business By Infringing IBM's Patents.**

17 124. Zillow provides customers with access to real estate listings and provides real estate  
 18 agents with advertisements and other services. Zillow also purchases homes directly from customers  
 19 that they repair and sell.<sup>27</sup> Zillow Group and its subsidiaries have grown rapidly over the last several  
 20 years and now have over one billion dollars of annual revenue.<sup>28</sup>

21 125. Rather than build their business on their own technologies, Zillow has appropriated  
 22 the inventions of the Patents-in-Suit. The website, including at least [www.zillow.com](http://www.zillow.com),  
 23 [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the associated mobile applications,

24 <sup>27</sup> Ex. 7 (<https://www.zillow.com/offers/>) (describing the process by which Zillow purchases and  
 25 then sells homes).

<sup>28</sup> Ex. 4 (Zillow Group 2018 10-K) at 42.

1 including at least the iOS and Android Zillow Real Estate & Rentals, Zillow Rentals, and Zillow  
 2 Premier Agent applications, under Zillow's control use the technology claimed by the Patents-in-  
 3 Suit to provide customers with access to real estate listings; provide Zillow's Business-to-Business  
 4 services, provide advertisements and other services for real estate agents, including through  
 5 Promoted Communities for new constructions, Zillow's Premier Agent service, and other properties  
 6 involving Zillow Group Media; and buy, service, advertise, and provide properties through Zillow  
 7 Offers. IBM has informed Zillow of its infringement, but Zillow continues to infringe despite the  
 8 knowledge of their infringement.

9       126. IBM has attempted to reach a patent licensing agreement to end Zillow's  
 10 unauthorized use of IBM's patents since at least June 2016. Since that time, IBM has sent Zillow  
 11 numerous letters concerning their infringement of the Patents-in-Suit. IBM has also met and held  
 12 telephone calls with representatives from Zillow to attempt to negotiate a license.

13       127. On August 11, 2017, IBM sent Zillow a letter informing them that they were  
 14 infringing several patents, including the '849 and '789 patents. On October 31, 2017, IBM further  
 15 informed Zillow that it was infringing the '346 patent. At a meeting between the parties on  
 16 November 13, 2017, IBM presented detailed claim charts demonstrating how Zillow was infringing  
 17 the '849, '789, and '346 patents, along with several others patents.

18       128. IBM informed Zillow that it was infringing the '183 and '389 patents on January 14,  
 19 2019. At that time, IBM also provided detailed claim charts demonstrating how Zillow was  
 20 infringing those patents. Then, on August 26, 2019, IBM informed Zillow that it was infringing the  
 21 '904 and '443 patents and again provided detailed claim charts demonstrating their infringement.  
 22 Finally, on November 25, 2019, IBM provided additional evidence of Zillow's infringement of the  
 23 '183 patent, including an additional detailed claim chart demonstrating this infringement.

24       129. IBM has repeatedly attempted to reach a negotiated solution to Zillow's infringement  
 25 of the Patents-in-Suit and has presented detailed examples of their infringement of each of the

1 Patents-in-Suit. But Zillow has refused to engage in any meaningful discussions about reaching a  
2 license agreement to end their infringement of IBM's patents. Instead, Zillow has continued to  
3 willfully infringe IBM's patents so as to obtain the significant benefits of IBM's innovations without  
4 paying any compensation to IBM.

5        130. Because IBM's over three-year struggle to negotiate a license agreement that  
6 remedies Zillow's unlawful conduct has failed, IBM has been forced to seek relief through litigation.  
7 Among other relief sought, IBM seeks royalties on the billions of dollars in revenue that Zillow has  
8 received based on their infringement of IBM's patented technology.

9       131. Zillow has challenged the patent eligibility of the patents in this action. However, all  
10 of the asserted claims recite technical solutions to technical problems and include unconventional  
11 inventive concepts, as confirmed by both parties' claim construction positions and the claims  
12 themselves.<sup>29</sup>

## **COUNT ONE**

## **INFRINGEMENT OF THE '849 PATENT**

132. IBM incorporates by reference paragraphs 1-131.

16        133. IBM is the owner of all right, title and interest in the '849 patent. The '849 patent  
17 was duly and properly issued by the USPTO on July 4, 2006. The '849 patent was duly assigned to  
18 IBM. A copy of the '849 patent is attached hereto as Exhibit 42.

134. The '849 patent is valid and enforceable.

20        135. In violation of 35 U.S.C. § 271, Zillow has infringed, contributed to the infringement  
21 of, and/or induced others to infringe one or more of the claims of the '849 patent by having made,  
22 designed, offered for sale, sold, provided, used, maintained, and/or supported their website,  
23 including at least [www.zillow.com](http://www.zillow.com), [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the

<sup>24</sup> Ex. 90, 2020-05-19 IBM Rule 4-2 Exchange of Preliminary Claim Constructions; Ex. 91, 2020-05-19 Zillow Preliminary Claim Construction; Ex. 92, August 20, 2020 Joint Status Report (Dkt. No. 131); Ex. 93, Inventive Concept Chart.

1 associated mobile applications, including the Zillow applications for mobile devices running on, for  
 2 example, the Apple iOS and Google Android operating systems, including at least Zillow Real Estate  
 3 & Rentals, Zillow Rentals, and Zillow Premier Agent applications. Zillow's infringement is  
 4 continuing.

5       136. Zillow Group "operates the largest portfolio of real estate and home-related brands  
 6 on mobile and the web which focus on all stages of the home lifecycle: renting, buying, selling and  
 7 financing. . . . The Zillow Group portfolio of consumer brands includes Zillow . . . ."<sup>30</sup> Zillow  
 8 Group's "technology solutions" and actions related to such technology infringe, direct or control  
 9 infringement, induce infringement, and/or contribute to the infringement through Zillow's website  
 10 and through the mobile application instrumentalities.

11       137. Zillow, Inc. owns and operates the Zillow website, including at least  
 12 www.zillow.com, www.zillowgroupmedia.com, and subdomains thereof, and the Zillow mobile  
 13 applications on, for example, the iOS and Android operating systems. Zillow, Inc. provides online  
 14 real estate listings and related services to consumers and local real estate agents through the website  
 15 and mobile application instrumentalities.

16       138. Zillow Group and Zillow, Inc. directly infringe one or more claims of the '849 patent,  
 17 including claims 1-9, 12-22, and 25, as described below and in Exhibit 94, Exs. A-C. Additionally,  
 18 Zillow Group directs and controls the infringing behavior of its agent, Zillow, Inc., which Zillow  
 19 Group operates and wholly owns.

20       139. For example, as shown in Exhibit 43, the Zillow website and Zillow mobile  
 21 applications infringe at least claim 1 of the '849 patent at least by:

22           a. presenting advertising obtained from a computer network, the network  
 23 including a multiplicity of user reception systems at which respective users can request applications,  
 24 from the network, that include interactive services, the respective reception systems including a

25 <sup>30</sup> Ex. 4 (Zillow Group 2018 10-K) at 3.

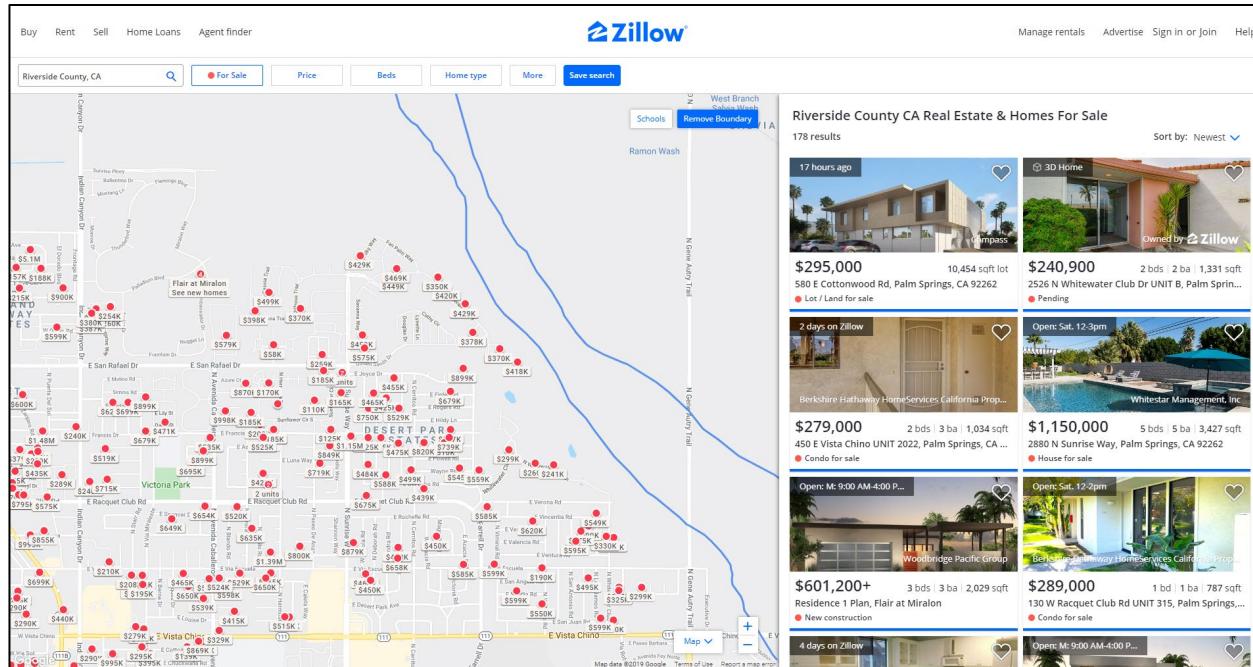
1 monitor at which at least the visual portion of the applications can be presented as one or more  
2 screens of display, the method comprising the steps of:

3                   b. structuring applications so that they may be presented, through the network,  
4 at a first portion of one or more screens of display; and:

5                   c. structuring advertising in a manner compatible to that of the applications so  
6 that it may be presented, through the network, at a second portion of one or more screens of display  
7 concurrently with applications, wherein structuring the advertising includes configuring the  
8 advertising as objects that include advertising data and;

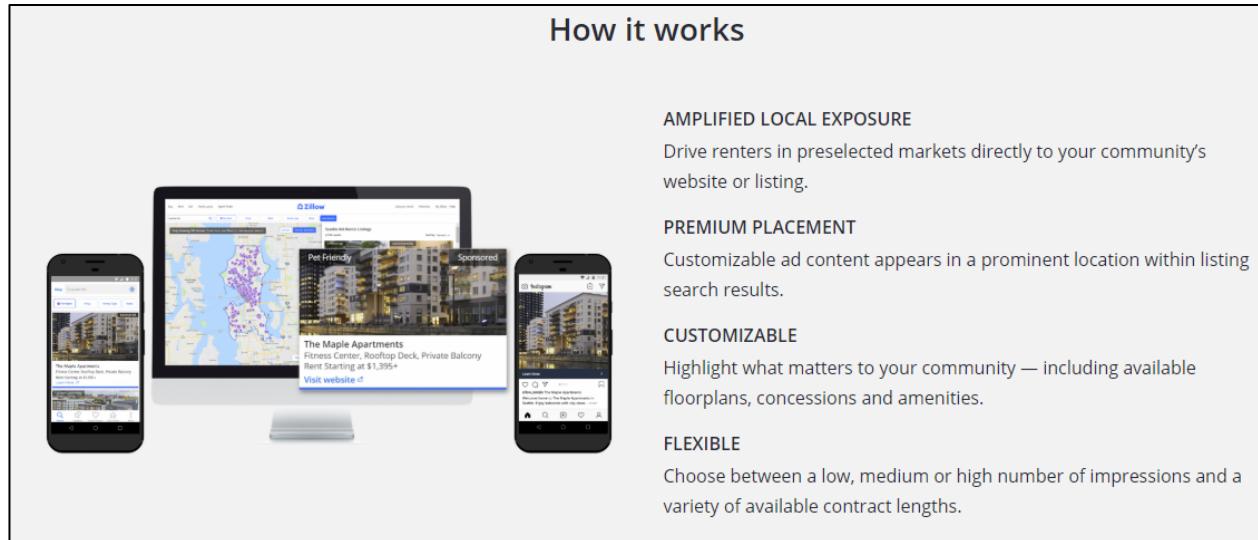
9                   d. selectively storing advertising objects at a store established at the reception  
10 system.

11                  140. For another example, Zillow Group and Zillow, Inc. infringe at least claim 1 of the  
12 '849 patent through Zillow's website and mobile applications in a similar manner to that shown in  
13 Exhibit 43, at least when the advertising is from, or involves, Zillow Group Media; when the  
14 advertising is for properties Zillow owns through Zillow Offers; and when the advertising is for other  
15 advertised properties, such as Promoted Communities for new constructions, properties managed by  
16 or associated with Premier Agent, and other properties promoted using Zillow's advertising services.



Ex. 44 (Zillow search in Riverside County, CA).

Ex. 45 (<https://www.zillow.com/resources/new-construction/training/inline-community-preview/>).



Ex. 46 (<https://www.zillow.com/marketing/rental-property-advertising/>).

141. For another example, Zillow Group and Zillow, Inc. infringe at least claim 1 of the '849 patent through the Zillow Group Media service in at least a similar manner to that shown in the Exhibit 43 claim chart:

## Ad Products

Reach coveted audiences by featuring your brand in native placements across Zillow Group brands and devices. Integrate your message into the user experience with ad products that are perfectly formatted for every device to achieve outstanding performance results.

Ex. 47 (<https://www.zillowgroupmedia.com/native-ads/>).

20 142. Zillow Group and Zillow, Inc. infringe at least claim 1 of the '849 patent through the  
21 Zillow mobile applications, including at least the iOS and Android Zillow Real Estate & Rentals,  
22 Zillow Rentals, and Zillow Premier Agent applications, in a similar manner as through the website.

23 143. Alternatively, to the extent that any step of claim 1 of the '849 patent, including the  
24 "structuring" or "selectively storing" steps, are performed by a third party (in addition to and/or  
25 separate from Zillow's performance), such as a user, browser, or mobile operating system, that

1 performance is attributable to Zillow, Inc. and Zillow Group at least because each Zillow entity has  
 2 an agency and/or contractual relationship with said third party and each Zillow entity controls and/or  
 3 directs the performance of said third party. For example, each Zillow entity controls and/or directs  
 4 the performance of the “selectively storing” step by users, browsers, and mobile operating systems  
 5 because it, for example, conditions receipt of a benefit, such as reduced latency, on the performance  
 6 of the claimed steps, and establishes the manner or timing of the performance by, for example,  
 7 determining what image and other data is cached and for how long. For another example, each  
 8 Zillow entity controls and/or directs the performance of the “selectively storing” step by users,  
 9 browsers, and mobile operating systems because it profits from the performance by, for example,  
 10 increasing use and user interactions from reduced latency, and each Zillow entity has the right to  
 11 stop or limit infringement, by, for example, determining that image and other data is not cached.

12       144. Alternatively, to the extent that any step of claim 1 of the '849 patent, including the  
 13 “structuring” or “selectively storing” steps, are performed by a third party (in addition to and/or  
 14 separate from Zillow’s performance), such as a Content Delivery Network (“CDN”) or other server,  
 15 including Amazon CloudFront, that performance is attributable to Zillow, Inc. and Zillow Group at  
 16 least because each Zillow entity has an agency and/or contractual relationship with said third party  
 17 and each Zillow entity controls and/or directs the performance of said third party. For example, each  
 18 Zillow entity controls and/or directs the performance of the “selectively storing” step by CDNs  
 19 because it, for example, conditions receipt of a benefit, such as payment for services, on the  
 20 performance of the claimed steps, and establishes the manner or timing of the performance by, for  
 21 example, determining what image and other data is cached and for how long. For another example,  
 22 each Zillow entity controls and/or directs the performance of the “selectively storing” step by CDNs  
 23 because it profits from the performance by, for example, increasing use and user interactions from  
 24 reduced latency, and each Zillow entity has the right to stop or limit infringement, by, for example,  
 25 determining that image and other data is not cached.

1 145. Zillow Group and Zillow, Inc. have had knowledge of the '849 patent and their  
 2 alleged direct and indirect infringement since August 11, 2017.

3 146. Zillow Group and Zillow, Inc. also indirectly infringe one or more claims of the '849  
 4 patent through the Zillow website, including at least [www.zillow.com](http://www.zillow.com),  
 5 [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the Zillow mobile applications. On  
 6 information and belief, in certain circumstances, client devices and software (e.g., devices and  
 7 software used by end users and customers of Zillow's website and the associated mobile  
 8 applications) directly infringe the '849 patent through the use of the website and mobile applications  
 9 to view at least real estate listings. Zillow Group's Annual Report lists \$1,333,554,000 of revenue  
 10 from its website and mobile applications which "generate revenue from the sale of advertising  
 11 services and our suite of marketing software and technology solutions."<sup>31</sup> The revenue indicates that  
 12 numerous end users and customers used Zillow's website and the associated mobile applications in  
 13 order to view real estate listings and thereby infringe the '849 patent. In particular, to the extent  
 14 Zillow does not perform the method steps, in certain circumstances, client devices and software (e.g.,  
 15 devices and software used by end users and customers of Zillow's website and the associated mobile  
 16 applications) perform at least the method of presenting advertising recited by claim 1 of the '849  
 17 patent as shown in Exhibit 43.

18 147. On information and belief, despite knowledge of the infringement of the '849 patent,  
 19 Zillow Group and Zillow, Inc. have intended and continue to intend to contribute to patent  
 20 infringement by third parties by selling, offering to sell, and/or supplying components, and/or a  
 21 material or apparatus for use in practicing the patented methods of the '849 patent by at least end  
 22 users and consumers, as described in this section.

23 148. For example Zillow Group and Zillow Inc. provide computer code underlying the  
 24 Zillow website and mobile applications, such as HTML, JavaScript, and image files, to customers

25 <sup>31</sup> Ex. 4 (Zillow Group 2018 10-K) at 3, 42.

1 and end users for use in infringing the '849 patent and such computer code does not have substantial  
 2 non-infringing uses. Such computer code is especially made and/or especially adapted for use in  
 3 infringing the '849 patent and is not a staple article or commodity of commerce suitable for  
 4 substantial non-infringing use. The only substantial use of Zillow's computer code responses is for  
 5 the claimed subject matter involving presenting applications and advertisements in an interactive  
 6 service as described in the '849 patent.

7 149. Further, on information and belief, as a part of providing said computer code, Zillow  
 8 Group and Zillow, Inc. enter into binding contracts with end users and customers to use Zillow's  
 9 website and mobile applications, including in an infringing manner including by binding the users  
 10 to a terms of use for the accused website and mobile applications. On information and belief, Zillow  
 11 Group and Zillow, Inc. receive valuable consideration from customers and end users located in this  
 12 judicial district, including information provided by customers and end users, and/or information  
 13 automatically collected from customers and end users. When customers and end users in this judicial  
 14 district use the accused website and/or mobile applications, Zillow Group and Zillow, Inc. collect  
 15 information about the customers and end users, their devices, and their interaction with the accused  
 16 website and the associated mobile applications. Zillow Group and Zillow, Inc. work with service  
 17 providers and advertising networks to track and manage cookie information and activities of  
 18 customers and end users across different websites and devices. Third parties use cookie information  
 19 collected by Zillow Group and Zillow, Inc. to deliver advertisements to end users and customers  
 20 based on their use of the accused website and mobile applications. Zillow Group and Zillow, Inc.'s  
 21 business is primarily funded through advertising. The application and website are especially made  
 22 and/or especially adapted for use in infringing the Patents-in-Suit, at least as detailed in the individual  
 23 Counts above, and are not a staple article or commodity of commerce suitable for substantial non-  
 24 infringing uses because, among other things, the components sent to users are uniquely designed  
 25 only to access the infringing aspects of Zillow's website and mobile applications.

1       150. On information and belief, despite their knowledge of the infringement of the '849  
 2 patent, Zillow Group and Zillow, Inc. have intended and continue to intend to induce patent  
 3 infringement by third parties, including at least the direct infringement by end users and customer,  
 4 as described in this section. Zillow has encouraged and instructed and continues to encourage and  
 5 instruct customers and end users to use Zillow's website and the associated mobile applications in a  
 6 manner that infringes the '849 patent by advertising the website and mobile applications, providing  
 7 customer support, and designing their website and mobile applications in such a way that the use of  
 8 the website and mobile applications by an end user or customer infringes the '849 patent.

9       151. For example, Zillow has encouraged and instructed and continues to encourage and  
 10 instruct customers and end users to use Zillow's website and the associated mobile applications in  
 11 an infringing manner by providing customer support and designing their website and mobile  
 12 applications in such a way that the use of the website and mobile applications by an end user or  
 13 customer infringes the Patents-in-Suit. For example, on information and belief, customer service to  
 14 encourage and support customers and end users in their use of Zillow's website and the associated  
 15 mobile applications in an infringing manner. For another example,  
 16 <https://zillow.zendesk.com/hc/en-us> provides direction and support for Zillow's website. On  
 17 information and belief, to the extent Zillow was not aware that they were encouraging their  
 18 customers and end users to infringe the '849 patent, its lack of knowledge was based on being  
 19 willfully blind to the possibility that their acts would cause infringement.

20       152. IBM has been damaged by the infringement of its '849 patent by Zillow and will  
 21 continue to be damaged by such infringement. IBM is entitled to recover from Zillow the damages  
 22 sustained by IBM as a result of Zillow's wrongful acts.

23       153. The infringement by Zillow of the '849 patent was, and continues to be, deliberate  
 24 and willful, entitling IBM to increased damages under 35 U.S.C. § 284 and to attorney fees and costs  
 25 incurred in prosecuting this action under 35 U.S.C. § 285. In committing these acts of infringement,

1 Zillow actually knew or should have known that their actions constituted an unjustifiably high risk  
 2 of infringement of a valid and enforceable patent.

3 154. IBM has suffered and continues to suffer irreparable harm, for which there is no  
 4 adequate remedy at law, and will continue to do so unless Zillow is enjoined therefrom by this Court.  
 5 In committing these acts of infringement, Zillow actually knew or should have known that its actions  
 6 constituted an unjustifiably high risk of infringement of a valid and enforceable patent.

7 155. Zillow alleges that it does not infringe the claims of the '849 patent because the patent  
 8 claims a specific way of solving a technical problem that Zillow alleges it does not perform through  
 9 its website and/or mobile applications. *See* Exhibit 95, Appendix 1. Although IBM disagrees with  
 10 Zillow's contentions, those contentions demonstrate that Zillow agrees that the invention of the '849  
 11 patent teaches a particular way to solve a specific technical problem.

12 **COUNT TWO**

13 **INFRINGEMENT OF THE '346 PATENT**

14 156. IBM incorporates by reference paragraphs 1-155.

15 157. IBM is the owner of all right, title and interest in the '346 patent. The '346 patent  
 16 was duly and properly issued by the USPTO on December 8, 2009. The '346 patent was duly  
 17 assigned to IBM. A copy of the '346 patent is attached hereto as Exhibit 48.

18 158. The '346 patent is valid and enforceable.

19 159. In violation of 35 U.S.C. § 271, Zillow has infringed one or more of the claims of the  
 20 '346 patent by having made, designed, offered for sale, sold, provided, used, maintained, and/or  
 21 supported their website, including at least [www.zillow.com](http://www.zillow.com), [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and  
 22 subdomains thereof, and the associated mobile applications, including the Zillow applications for  
 23 mobile devices running on, for example, the Apple iOS and Google Android operating systems,  
 24 including at least Zillow Real Estate & Rentals, Zillow Rentals, and Zillow Premier Agent  
 25 applications. Zillow's infringement is continuing.

1       160. Zillow Group “operates the largest portfolio of real estate and home-related brands  
 2 on mobile and the web which focus on all stages of the home lifecycle: renting, buying, selling and  
 3 financing. . . . The Zillow Group portfolio of consumer brands includes Zillow . . . .”<sup>32</sup> Zillow  
 4 Group’s “technology solutions” and actions related to such technology infringe and/or direct or  
 5 control infringement through Zillow’s website and through the mobile application instrumentalities.

6       161. Zillow, Inc. owns and operates the Zillow website, including at least  
 7 www.zillow.com, www.zillowgroupmedia.com, and subdomains thereof, and the Zillow mobile  
 8 applications on, for example, the iOS and Android operating systems. Zillow, Inc. provides online  
 9 real estate listings and related services to consumers and local real estate agents through the website  
 10 and mobile application instrumentalities.

11       162. Zillow Group and Zillow, Inc. directly infringe one or more claims of the ’346 patent,  
 12 including claims 1-3, 5, 8, 10, and 12-13, as described below and in Exhibit 94, Exs. D-E.  
 13 Additionally, Zillow Group directs and controls the infringing behavior of its agent, Zillow, Inc.,  
 14 which Zillow Group operates and wholly owns.

15       163. For example, as shown in Exhibit 49, the Zillow website and Zillow mobile  
 16 applications infringe at least claim 1 of the ’346 patent at least by:

17           a. managing user authentication within a distributed data processing system,  
 18 wherein a first system and a second system interact within a federated computing environment and  
 19 support single-sign-on operations in order to provide access to protected resources, at least one of  
 20 the first system and the second system comprising a processor, the method comprising:

21           b. triggering a single-sign-on operation on behalf of the user in order to obtain  
 22 access to a protected resource that is hosted by the second system, wherein the second system  
 23 requires a user account for the user to complete the single-sign-on operation prior to providing access  
 24 to the protected resource;

25       <sup>32</sup> Ex. 4 (Zillow Group 2018 10-K) at 3.

- c. receiving from the first system at the second system an identifier associated with the user; and

d. creating a user account for the user at the second system based at least in part on the received identifier associated with the user after triggering the single-sign-on operation but before generating at the second system a response for accessing the protected resource, wherein the created user account supports single-sign-on operations between the first system and the second system on behalf of the user.

8 164. The Zillow mobile applications, including at least the Zillow Real Estate & Rentals  
9 and the Zillow Rentals applications, infringe at least claim 1 of the '346 patent in a similar manner  
10 as through the website.

11        165. Alternatively, to the extent that any step of claim 1 of the '346 patent, including the  
12 "triggering" step, is performed by a third party (in addition to and/or separate from Zillow's  
13 performance), such as a user, browser, or mobile operating system, that performance is attributable  
14 to Zillow, Inc. and Zillow Group at least because each Zillow entity has an agency and/or contractual  
15 relationship with said third party and each Zillow entity controls and/or directs the performance of  
16 said third party. For example, each Zillow entity controls and/or directs the performance of the  
17 "triggering" step by users, browsers, and mobile operating systems because it, for example,  
18 conditions receipt of a benefit, such as access to certain applications on Zillow's website and mobile  
19 applications, on the performance of the claimed steps, and establishes the manner or timing of the  
20 performance by, for example, triggering the single-sign-on operation using its underlying computer  
21 code. For another example, each Zillow entity controls and/or directs the performance of the  
22 "triggering" step by users, browsers, and mobile operating systems because it profits from the  
23 performance by, for example, increasing the number of signed-in users accessing Zillow's website  
24 and mobile applications, and each Zillow entity has the right to stop or limit infringement, by, for  
25 example, not enabling the use of single-sign-on operations or account creation.

1 166. Zillow Group and Zillow, Inc. have had knowledge of the '346 patent and their  
 2 alleged direct and indirect infringement since October 31, 2017.

3 167. IBM has been damaged by the infringement of its '346 patent by Zillow and will  
 4 continue to be damaged by such infringement. IBM is entitled to recover from Zillow the damages  
 5 sustained by IBM as a result of Zillow's wrongful acts.

6 168. The infringement by Zillow of the '346 patent was, and continues to be, deliberate  
 7 and willful, entitling IBM to increased damages under 35 U.S.C. § 284 and to attorney fees and costs  
 8 incurred in prosecuting this action under 35 U.S.C. § 285. In committing these acts of infringement,  
 9 Zillow actually knew or should have known that its actions constituted an unjustifiably high risk of  
 10 infringement of a valid and enforceable patent.

11 169. IBM has suffered and continues to suffer irreparable harm, for which there is no  
 12 adequate remedy at law, and will continue to do so unless Zillow is enjoined therefrom by this Court.  
 13 In committing these acts of infringement, Zillow actually knew or should have known that their  
 14 actions constituted an unjustifiably high risk of infringement of a valid and enforceable patent.

15 170. Zillow alleges that it does not infringe the claims of the '346 patent because the patent  
 16 claims a specific way of solving a technical problem that Zillow alleges it does not perform through  
 17 its website and/or mobile applications. *See* Exhibit 95, Appendix 4. Although IBM disagrees with  
 18 Zillow's contentions, those contentions demonstrate that Zillow agrees that the invention of the '346  
 19 patent teaches a particular way to solve a specific technical problem.

20 **COUNT THREE**

21 **INFRINGEMENT OF THE '183 PATENT**

22 171. IBM incorporates by reference paragraphs 1-170.

23 172. IBM is the owner of all right, title and interest in the '183 patent. The '183 patent  
 24 was duly and properly issued by the USPTO on January 26, 2016. The '183 patent was duly assigned  
 25 to IBM. A copy of the '183 patent is attached hereto as Exhibit 50.

1 173. The '183 patent is valid and enforceable.

2 174. In violation of 35 U.S.C. § 271, Zillow has infringed, contributed to the infringement  
 3 of, and/or induced others to infringe one or more of the claims of the '183 patent by having made,  
 4 designed, offered for sale, sold, provided, used, maintained, and/or supported their website,  
 5 including at least [www.zillow.com](http://www.zillow.com), [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the  
 6 associated mobile applications, including the Zillow applications for mobile devices running on, for  
 7 example, the Apple iOS and Google Android operating systems, including at least Zillow Real Estate  
 8 & Rentals, Zillow Rentals, and Zillow Premier Agent applications. Zillow's infringement is  
 9 continuing.

10 175. Zillow Group "operates the largest portfolio of real estate and home-related brands  
 11 on mobile and the web which focus on all stages of the home lifecycle: renting, buying, selling and  
 12 financing. . . . The Zillow Group portfolio of consumer brands includes Zillow . . . ."<sup>33</sup> Zillow  
 13 Group's "technology solutions" and actions related to such technology infringe, direct or control  
 14 infringement, induce infringement, and/or contribute to the infringement through Zillow's website  
 15 and through the mobile application instrumentalities.

16 176. Zillow, Inc. owns and operates the Zillow website, including at least  
 17 [www.zillow.com](http://www.zillow.com), [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the Zillow mobile  
 18 applications on, for example, the iOS and Android operating systems. Zillow, Inc. provides online  
 19 real estate listings and related services to consumers and local real estate agents through the website  
 20 and mobile application instrumentalities.

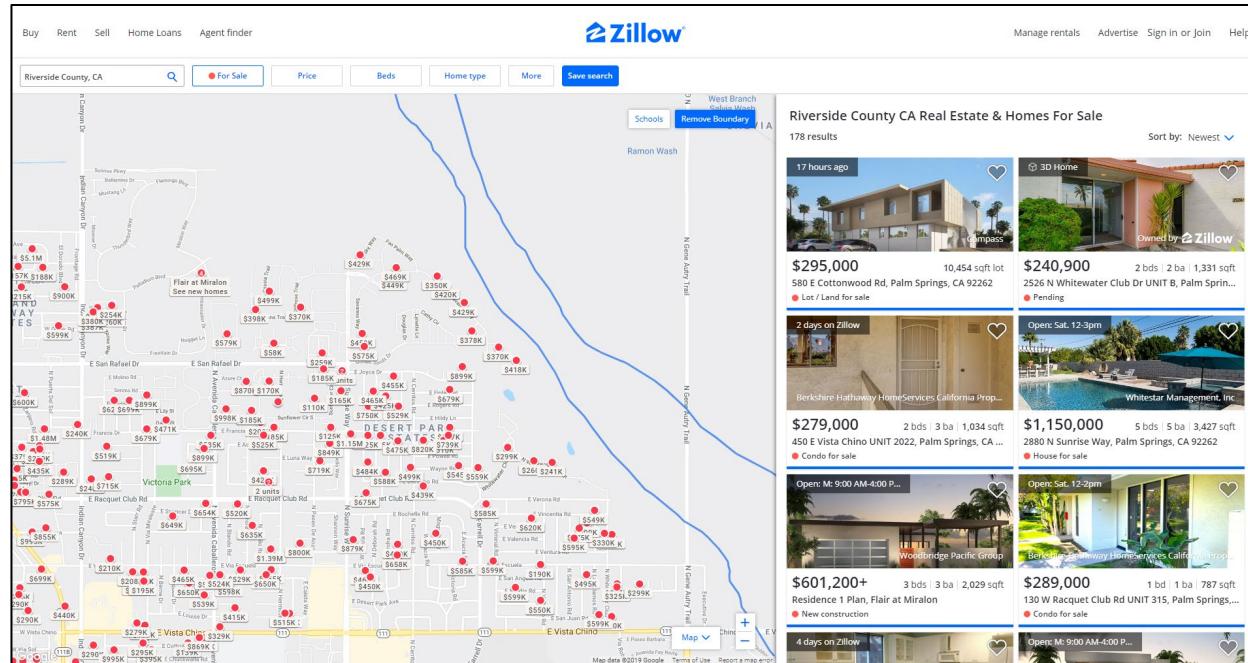
21 177. Zillow Group and Zillow, Inc. directly infringe one or more claims of the '183 patent,  
 22 including claims 1-20, as described below and in Exhibit 94, Exs. T-Y. Additionally, Zillow Group  
 23 directs and controls the infringing behavior of its agent, Zillow, Inc., which Zillow Group operates  
 24 and wholly owns.

25 <sup>33</sup> Ex. 4 (Zillow Group 2018 10-K) at 3.

1       178. For example, as shown in Exhibit 51, the Zillow website and Zillow mobile  
 2 applications infringe at least claim 1 of the '183 patent at least by:

- 3           a. retrieving in real time, by a computer processor of a computing system, image  
 4 data associated with a plurality of locations within a specified geographical area;
- 5           b. comparing, by said computer processor, said image data to a plurality of  
 6 stored image data, wherein said plurality of stored image data comprise baseline measurement values  
 7 associated with an expected condition level of baseline locations within a baseline geographical area;
- 8           c. calculating, by said computer processor based on results of said comparing,  
 9 condition score values associated with said plurality of locations, wherein said condition score values  
 10 indicate real time condition values associated with said plurality of locations;
- 11          d. calculating, by said computer processor based on said condition score values,  
 12 an overall condition score value associated with said specified geographical area; and
- 13          e. generating, by said computer processor, a map indicating said overall  
 14 condition score value associated with said specified geographical area.

15       179. For another example, Zillow Group and Zillow, Inc. infringe at least claim 1 of the  
 16 '183 patent through Zillow's website and mobile applications in a similar manner to that shown in  
 17 the Exhibit 51 claim chart at least when the properties are from, or involve, Zillow Group Media;  
 18 when the properties are properties Zillow owns through Zillow Offers; and when the properties are,  
 19 for example, properties from Promoted Communities for new constructions, properties managed by  
 20 or associated with Premier Agent, and other properties promoted using Zillow's advertising services.



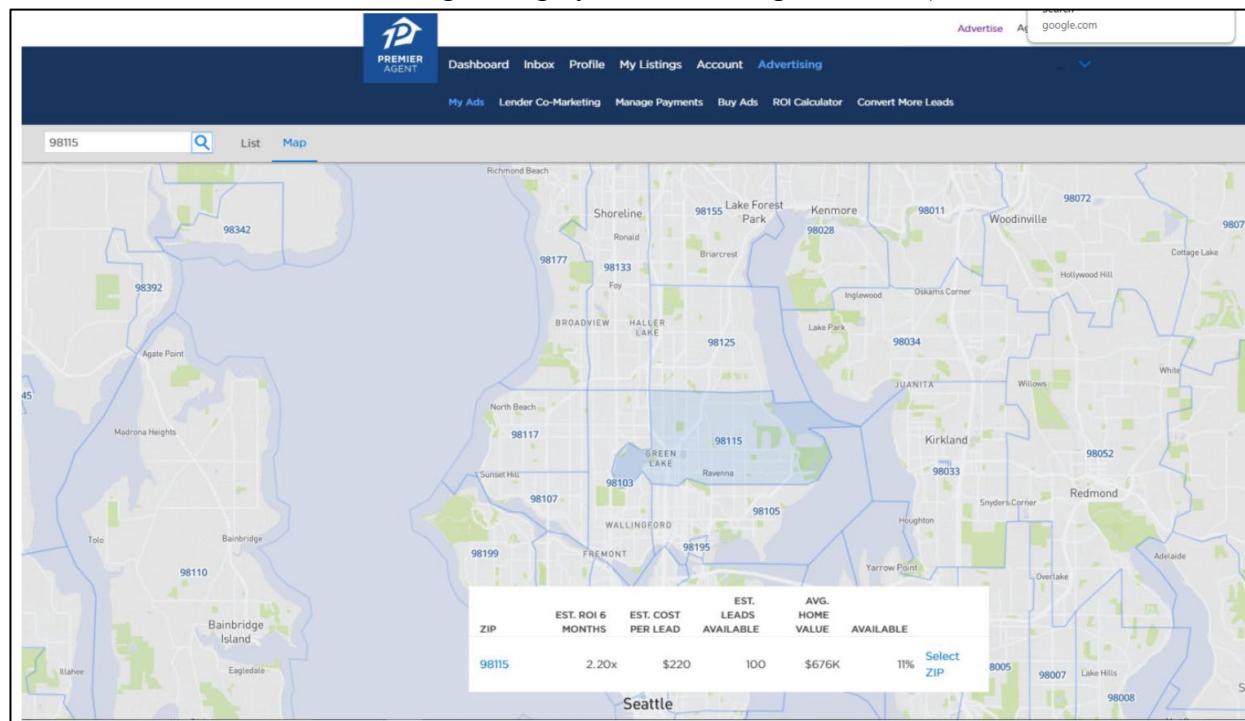
Ex. 44 (Zillow search in Riverside County, CA).

Ex. 45 (<https://www.zillow.com/resources/new-construction/training/inline-community-preview/>).

1 180. For another example, Zillow Group and Zillow, Inc. infringe at least claim 1 of the  
 2 '183 patent through the Premier Agent service in at least a similar manner to that shown in the  
 3 Exhibit 51 claim chart:

ZIP	1 AVG HOME VALUE	2 EST. LEADS	3 EST. COST PER LEAD	4 EST. ROI 6 MONTHS	5 SHARE OF VOICE	6 MONTHLY BUDGET	Total Budget: \$7,943.50
98290	\$443K	21.4	\$112	3.95x	46.6%	\$1,405	⋮
98125	\$558K	15.3	\$204	2.74x	67.9%	\$3,109	⋮
98155	\$515K	11.2	\$213	2.42x	46.0%	\$1,985	⋮
98275	\$531K	7.0	\$114	2.57x	55.5%	\$1,445	⋮

11 Ex. 52 (<https://www.zillow.com/agent-resources/training/manage-premier-agent-advertising/manage-your-advertising-on-zillow/>).



23 Ex. 52 (<https://www.zillow.com/agent-resources/training/manage-premier-agent-advertising/manage-your-advertising-on-zillow/>).

1       181. The Zillow mobile applications, including at least the Zillow Real Estate & Rentals,  
 2 Zillow Rentals, and Zillow Premier Agent applications, infringe at least claim 1 of the '183 patent  
 3 in a similar manner as through the website.

4       182. Alternatively, to the extent that any step of claim 1 of the '183 patent, including the  
 5 "generating" step, is performed by a third party (in addition to and/or separate from Zillow's  
 6 performance), such as a user, browser, or mobile operating system, that performance is attributable  
 7 to Zillow, Inc. and Zillow Group at least because each Zillow entity has an agency and/or contractual  
 8 relationship with said third party and each Zillow entity controls and/or directs the performance of  
 9 said third party. For example, each Zillow entity controls and/or directs the performance of the  
 10 "generating" step by users, browsers, and mobile operating systems because it, for example,  
 11 conditions receipt of a benefit, such as viewing accurate home and neighborhood value estimates,  
 12 on the performance of the claimed steps, and establishes the manner or timing of the performance  
 13 by, for example, determining the method by which the Zestimate and ZHVI is calculated and the  
 14 map is generated using computer code, such as HTML and JavaScript. For another example, each  
 15 Zillow entity controls and/or directs the performance of the "generating" step by users, browsers,  
 16 and mobile operating systems because it profits from the performance by, for example, increasing  
 17 the number of users through updated home and neighborhood valuations, and each Zillow entity has  
 18 the right to stop or limit infringement, by, for example, removing this image processing feature from  
 19 the Zestimate feature or not providing computer code to generate the map.

20       183. Alternatively, to the extent any step of claim 1 of the '183 patent, including the  
 21 "generating" step, is performed by a third party (in addition to and/or separate from Zillow's  
 22 performance), such as a Content Delivery Network ("CDN") or other server, including Amazon  
 23 CloudFront, that performance is attributable to Zillow, Inc. and Zillow Group at least because each  
 24 Zillow entity has an agency and/or contractual relationship with said third party and each Zillow  
 25 entity controls and/or directs the performance of said third party. For example, each Zillow entity

1 controls and/or directs the performance of the “generating” step by CDNs because it, for example,  
 2 conditions receipt of a benefit, such as payment for services, on the performance of the claimed  
 3 steps, and establishes the manner or timing of the performance by, for example, determining the  
 4 method by which the Zestimate and ZHVI is calculated and the map is generated using computer  
 5 code, such as HTML and JavaScript. For another example, each Zillow entity controls and/or directs  
 6 the performance of the “generating” step by CDNs because it profits from the performance by, for  
 7 example, increasing the number of users through updated home and neighborhood valuations, and  
 8 each Zillow entity has the right to stop or limit infringement, by, for example, removing this image  
 9 processing feature from the Zestimate feature or not providing computer code to generate the map.

10       184. Zillow Group and Zillow, Inc. have had knowledge of the '183 patent and their  
 11 alleged direct and indirect infringement since January 14, 2019.

12       185. Zillow Group and Zillow, Inc. also indirectly infringe one or more claims of the '183  
 13 patent through the Zillow website, including at least [www.zillow.com](http://www.zillow.com),  
 14 [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the Zillow mobile applications. On  
 15 information and belief, in certain circumstances, client devices and software (e.g., devices and  
 16 software used by end users and customers of Zillow's website and the associated mobile  
 17 applications) directly infringe the '183 patent through the use of the website and mobile applications  
 18 to view at least real estate listings, Zestimates, and Zillow Home Value Indexes. Zillow Group's  
 19 Annual Report lists \$1,333,554,000 of revenue from its website and mobile applications which  
 20 “generate revenue from the sale of advertising services and our suite of marketing software and  
 21 technology solutions.”<sup>34</sup> The revenue indicates that numerous end users and customers used  
 22 Zillow's website and the associated mobile application in order to view real estate listings,  
 23 Zestimates, and ZHVI values and thereby infringe the '183 patent. In particular, to the extent Zillow  
 24 does not perform the method steps, in certain circumstances, client devices and software (e.g.,

25 <sup>34</sup> Ex. 4 (Zillow Group 2018 10-K) at 3, 42.

1 devices and software used by end users and customers of Zillow's website and the associated mobile  
 2 applications) perform at least the method of calculating geographical condition score values recited  
 3 by claim 1 of the '183 patent as shown in Exhibit 51.

4 186. On information and belief, despite knowledge of the infringement of the '183 patent,  
 5 Zillow Group and Zillow, Inc. have intended and continue to intend to contribute to patent  
 6 infringement by third parties by selling, offering to sell, and/or supplying components, and/or a  
 7 material or apparatus for use in practicing the patented methods of the '183 patent by at least end  
 8 users and consumers, as described in this section.

9 187. For example Zillow Group and Zillow Inc. provide computer code underlying the  
 10 Zillow website and mobile applications, such as HTML, JavaScript, and image files, to customers  
 11 and end users for use in infringing the '183 patent and such computer code does not have substantial  
 12 non-infringing uses. Such computer code is especially made and/or especially adapted for use in  
 13 infringing the '183 patent and is not a staple article or commodity of commerce suitable for  
 14 substantial non-infringing use. The only substantial use of Zillow's computer code responses is for  
 15 the claimed subject matter involving calculating geographical condition score values using image  
 16 data as described in the '183 patent.

17 188. Further, on information and belief, as a part of providing said computer code, Zillow  
 18 Group and Zillow, Inc. enter into binding contracts with end users and customers to use Zillow's  
 19 website and mobile applications, including in an infringing manner including by binding the users  
 20 to a terms of use for the accused website and mobile applications. On information and belief, Zillow  
 21 Group and Zillow, Inc. receive valuable consideration from customers and end users located in this  
 22 judicial district, including information provided by customers and end users, and/or information  
 23 automatically collected from customers and end users. When customers and end users in this judicial  
 24 district use the accused website and/or mobile applications, Zillow Group and Zillow, Inc. collect  
 25 information about the customers and end users, their devices, and their interaction with the accused

1 website and the associated mobile application. Zillow Group and Zillow, Inc. work with service  
 2 providers and advertising networks to track and manage cookie information and activities of  
 3 customers and end users across different websites and devices. Third parties use cookie information  
 4 collected by Zillow Group and Zillow, Inc. to deliver advertisements to end users and customers  
 5 based on their use of the accused website and mobile applications. Zillow Group and Zillow, Inc.'s  
 6 business is primarily funded through advertising. The applications and website are especially made  
 7 and/or especially adapted for use in infringing the Patents-in-Suit, at least as detailed in the individual  
 8 Counts above, and are not a staple article or commodity of commerce suitable for substantial non-  
 9 infringing uses because, among other things, the components sent to users are uniquely designed  
 10 only to access the infringing aspects of Zillow's website and mobile applications.

11 189. On information and belief, despite their knowledge of the infringement of the '183  
 12 patent, Zillow Group and Zillow, Inc. have intended and continue to intend to induce patent  
 13 infringement by third parties, including at least the direct infringement by end users and customer,  
 14 as described in this section. Zillow has and continues to encourage and instruct customers and end  
 15 users to use Zillow's website and the associated mobile applications in a manner that infringes the  
 16 '183 patent by advertising the website and mobile applications, providing customer support, and  
 17 designing their website and mobile applications in such a way that the use of the website and mobile  
 18 applications by an end user or customer infringes the '183 patent.

19 190. For example, Zillow has encouraged and continues to encourage and instruct  
 20 customers and end users to use Zillow's website and the associated mobile applications in an  
 21 infringing manner by providing customer support and designing their website and mobile  
 22 applications in such a way that the use of the website and mobile applications by an end user or  
 23 customer infringes the Patents-in-Suit. For example, on information and belief, Zillow's customer  
 24 service encourages and supports customers and end users in their use of Zillow's website and the  
 25 associated mobile applications in an infringing manner. For another example,

1 https://zillow.zendesk.com/hc/en-us provides direction and support Zillow's website. As of  
 2 November 11, 2019, which is after the filing of the Complaint, Zillow continues to instructs its  
 3 customers and end users in this judicial district to edit, add, or remove photos to influence Zestimate  
 4 values in a manner that infringes at least claim 1 of the '183 patent.<sup>35</sup> On information and belief, to  
 5 the extent Zillow was not aware that they were encouraging their customers and end users to infringe  
 6 the '183 patent, its lack of knowledge was based on being willfully blind to the possibility that their  
 7 acts would cause infringement.

8 191. IBM has been damaged by the infringement of its '183 patent by Zillow and will  
 9 continue to be damaged by such infringement. IBM is entitled to recover from Zillow the damages  
 10 sustained by IBM as a result of Zillow's wrongful acts.

11 192. The infringement by Zillow of the '183 patent was, and continues to be, deliberate  
 12 and willful, entitling IBM to increased damages under 35 U.S.C. § 284 and to attorney fees and costs  
 13 incurred in prosecuting this action under 35 U.S.C. § 285. In committing these acts of infringement,  
 14 Zillow actually knew or should have known that its actions constituted an unjustifiably high risk of  
 15 infringement of a valid and enforceable patent.

16 193. IBM has suffered and continues to suffer irreparable harm, for which there is no  
 17 adequate remedy at law, and will continue to do so unless Zillow is enjoined therefrom by this Court.  
 18 In committing these acts of infringement, Zillow actually knew or should have known that its actions  
 19 constituted an unjustifiably high risk of infringement of a valid and enforceable patent.

20 194. Zillow alleges that it does not infringe the claims of the '183 patent because the patent  
 21 claims a specific way of solving a technical problem that Zillow alleges it does not perform through  
 22 its website and/or mobile applications. *See* Exhibit 95, Appendices 7-8. Although IBM disagrees  
 23

24 25 <sup>35</sup> Ex. 53 (<https://zillow.zendesk.com/hc/en-us/articles/203511930-How-do-I-add-or-remove-photos-of-my-home->); Ex. 54 (<https://www.zillow.com/sellerlanding/edithyourhome/>); Ex. 55 (<https://www.zillow.com/blog/zestimate-updates-230614/>).

1 with Zillow's contentions, those contentions demonstrate that Zillow agrees that the invention of the  
 2 '183 patent teaches a particular way to solve a specific technical problem.

3 **COUNT FOUR**

4 **INFRINGEMENT OF THE '789 PATENT**

5 195. IBM incorporates by reference paragraphs 1-194.

6 196. IBM is the owner of all right, title and interest in the '789 patent. The '789 patent  
 7 was duly and properly issued by the USPTO on Oct. 13, 2015. The '789 patent was duly assigned  
 8 to IBM. A copy of the '789 patent is attached hereto as Exhibit 56.

9 197. The '789 patent is valid and enforceable.

10 198. In violation of 35 U.S.C. § 271, Zillow has infringed, contributed to the infringement  
 11 of, and/or induced others to infringe one or more of the claims of the '789 patent by having made,  
 12 designed, offered for sale, sold, provided, used, maintained, and/or supported its website, including  
 13 at least [www.zillow.com](http://www.zillow.com), [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the associated  
 14 mobile applications, including the Zillow applications for mobile devices running on, for example,  
 15 the Apple iOS and Google Android operating systems, including at least Zillow Real Estate &  
 16 Rentals, Zillow Rentals, and Zillow Premier Agent applications. Zillow's infringement is  
 17 continuing.

18 199. Zillow Group "operates the largest portfolio of real estate and home-related brands  
 19 on mobile and the web which focus on all stages of the home lifecycle: renting, buying, selling and  
 20 financing. . . . The Zillow Group portfolio of consumer brands includes Zillow . . . ."<sup>36</sup> Zillow  
 21 Group's "technology solutions" and actions related to such technology infringe, direct or control  
 22 infringement, induce infringement, and/or contribute to the infringement through Zillow's website  
 23 and through the mobile application instrumentalities.

24  
 25 <sup>36</sup> Ex. 4 (Zillow Group 2018 10-K) at 3.

1       200. Zillow, Inc. owns and operates the Zillow website, including at least  
 2 www.zillow.com, www.zillowgroupmedia.com, and subdomains thereof, and the Zillow mobile  
 3 applications on, for example, the iOS and Android operating systems. Zillow, Inc. provides online  
 4 real estate listings and related services to consumers and local real estate agents through the website  
 5 and mobile application instrumentalities.

6       201. Zillow Group and Zillow, Inc. directly infringe one or more claims of the '789 patent,  
 7 including claims 1-2, 5-9, and 12-20, as described below, and in Exhibit 94, Exs. O-S. Additionally,  
 8 Zillow Group directs and controls the infringing behavior of its agent, Zillow, Inc., which Zillow  
 9 Group operates and wholly owns.

10       202. For example, as shown in Exhibit 57 the Zillow website and Zillow mobile  
 11 applications infringe at least claim 8 of the '789 patent at least by:

12           a. presenting a map display on a display device, wherein the map display  
 13 comprises elements within a viewing area of the map display, wherein the elements comprise  
 14 geospatial characteristics, wherein the elements comprise selected and unselected elements;

15           b. presenting a list display on the display device, wherein the list display  
 16 comprises a customizable list comprising the elements from the map display;

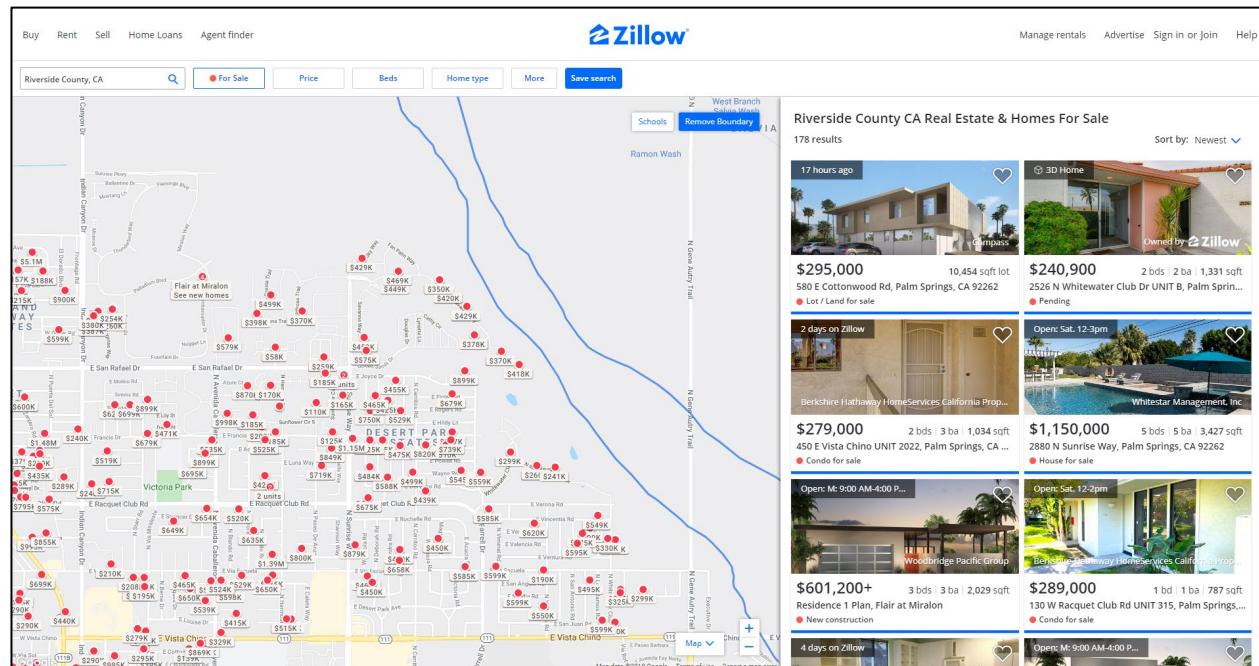
17           c. receiving a user input drawing a selection area in the viewing area of the map  
 18 display, wherein the selection area is a user determined shape, wherein the selection area is smaller  
 19 than the viewing area of the map display, wherein the viewing area comprises elements that are  
 20 visible within the map display and are outside the selection area;

21           d. selecting any unselected elements within the selection area in response to the  
 22 user input drawing the selection area and deselecting any selected elements outside the selection area  
 23 in response to the user input drawing the selection area; and

24           e. synchronizing the map display and the list display to concurrently update the  
 25 selection and deselection of the elements according to the user input, the selection and deselection

1 occurring on both the map display and the list display.

203. For another example, Zillow Group and Zillow, Inc. infringe at least claim 8 of the  
 3 '789 patent through Zillow's website and mobile applications in a similar manner to that shown in  
 4 the Exhibit 57 claim chart, at least when the shown properties are from, or involve, Zillow Group  
 5 Media; when the shown properties are properties Zillow owns through Zillow Offers; and when the  
 6 shown properties are, for example, properties from Promoted Communities for new constructions,  
 7 properties managed by or associated with Premier Agent, and other properties promoted using  
 8 Zillow's advertising services.



Ex. 44 (Zillow search in Riverside County, CA).



Ex. 45 (<https://www.zillow.com/resources/new-construction/training/inline-community-preview/>).

204. The Zillow mobile applications, including at least the Zillow Real Estate & Rentals, Zillow Rentals, and Zillow Premier Agent applications, infringe at least claim 8 of the '789 patent in a similar manner as through the website.

205. Alternatively, to the extent that any step of claim 8 of the '789 patent, including the “receiving a user input” step, is performed by a third party (in addition to and/or separate from Zillow’s performance), such as a user, browser, or mobile operating system, that performance is attributable to Zillow, Inc. and Zillow Group at least because each Zillow entity has an agency and/or contractual relationship with said third party and each Zillow entity controls and/or directs the performance of said third party. For example, each Zillow entity controls and/or directs the performance of the “receiving a user input” step by users, browsers, and mobile operating systems because it, for example, conditions receipt of a benefit, such as selecting a specific map area to search, on the performance of the claimed steps, and establishes the manner or timing of the performance by, for example, providing and controlling the Draw Your Own Search functionality. For another example, each Zillow entity controls and/or directs the performance of the “receiving a

1 user input" step by users, browsers, and mobile operating systems because it profits from the  
 2 performance by, for example, increasing use and user interactions from improved search  
 3 functionality, and each Zillow entity has the right to stop or limit infringement, by, for example,  
 4 removing the Draw Your Own Search feature.

5       206. Alternatively, to the extent any step of claim 8 of the '789 patent, including the  
 6 "receiving a user input" step, is performed by a third party (in addition to and/or separate from  
 7 Zillow's performance), such as a Content Delivery Network ("CDN") or other server, including  
 8 Amazon CloudFront, that performance is attributable to Zillow, Inc. and Zillow Group at least  
 9 because each Zillow entity has an agency and/or contractual relationship with said third party and  
 10 each Zillow entity controls and/or directs the performance of said third party. For example, each  
 11 Zillow entity controls and/or directs the performance of the "receiving a user input" step by CDNs  
 12 because it, for example, conditions receipt of a benefit, such as payment for services, on the  
 13 performance of the claimed steps, and establishes the manner or timing of the performance by, for  
 14 example, providing and controlling the Draw Your Own Search functionality. For another example,  
 15 each Zillow entity controls and/or directs the performance of the "receiving a user input" step by  
 16 CDNs because it profits from the performance by, for example, increasing use and user interactions  
 17 from improved search functionality, and each Zillow entity has the right to stop or limit infringement,  
 18 by, for example, removing the Draw Your Own Search feature.

19       207. Zillow Group and Zillow, Inc. have had knowledge of the '789 patent and their  
 20 alleged direct and indirect infringement since August 11, 2017.

21       208. Zillow Group and Zillow, Inc. also indirectly infringe one or more claims of the '789  
 22 patent through the Zillow website, including at least [www.zillow.com](http://www.zillow.com),  
 23 [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the Zillow mobile applications. On  
 24 information and belief, in certain circumstances, client devices and software (e.g., devices and  
 25 software used by end users and customers of Zillow's website and the associated mobile

1 applications) directly infringe the '789 patent through the use of the website and mobile applications  
 2 to view at least real estate listings. Zillow Group's Annual Report lists \$1,333,554,000 of revenue  
 3 from its website and mobile applications which "generate revenue from the sale of advertising  
 4 services and our suite of marketing software and technology solutions."<sup>37</sup> The revenue indicates that  
 5 numerous end users and customers used Zillow's website and the associated mobile application in  
 6 order to view real estate listings and thereby infringe the '789 patent. In particular, to the extent  
 7 Zillow does not perform the method steps, in certain circumstances, client devices and software (e.g.,  
 8 devices and software used by end users and customers of Zillow's website and the associated mobile  
 9 applications) perform at least the method of coordinated geospatial and list-based mapping recited  
 10 by claim 8 of the '789 patent as shown in Exhibit 57.

11       209. On information and belief, despite knowledge of the infringement of the '789 patent,  
 12 Zillow Group and Zillow, Inc. have intended and continue to intend to contribute to patent  
 13 infringement by third parties by selling, offering to sell, and/or supplying components, and/or a  
 14 material or apparatus for use in practicing the patented methods of the '789 patent by at least end  
 15 users and consumers, as described in this section.

16       210. For example Zillow Group and Zillow Inc. provide computer code underlying the  
 17 Zillow website and mobile applications, such as HTML, JavaScript, and image files, to customers  
 18 and end users for use in infringing the '789 patent and such computer code does not have substantial  
 19 non-infringing uses. Such computer code is especially made and/or especially adapted for use in  
 20 infringing the '789 patent and is not a staple article or commodity of commerce suitable for  
 21 substantial non-infringing use. The only substantial use of Zillow's computer code responses is for  
 22 the claimed subject matter involving coordinated geospatial and list-based mapping as described in  
 23 the '789 patent.

24

25 <sup>37</sup> Ex. 4 (Zillow Group 2018 10-K) at 3, 42.

1       211. Further, on information and belief, as a part of providing said computer code, Zillow  
 2 Group and Zillow, Inc. enter into binding contracts with end users and customers to use Zillow's  
 3 website and mobile applications, including in an infringing manner including by binding the users  
 4 to a terms of use for the accused website and mobile applications. On information and belief, Zillow  
 5 Group and Zillow, Inc. receive valuable consideration from customers and end users located in this  
 6 judicial district, including information provided by customers and end users, and/or information  
 7 automatically collected from customers and end users. When customers and end users in this judicial  
 8 district use the accused website and/or mobile applications, Zillow Group and Zillow, Inc. collect  
 9 information about the customers and end users, their devices, and their interaction with the accused  
 10 website and the associated mobile applications. Zillow Group and Zillow, Inc. work with service  
 11 providers and advertising networks to track and manage cookie information and activities of  
 12 customers and end users across different websites and devices. Third parties use cookie information  
 13 collected by Zillow Group and Zillow, Inc. to deliver advertisements to end users and customers  
 14 based on their use of the accused website and mobile applications. Zillow Group and Zillow, Inc.'s  
 15 business is primarily funded through advertising. The applications and website are especially made  
 16 and/or especially adapted for use in infringing the Patents-in-Suit, at least as detailed in the individual  
 17 Counts above, and are not a staple article or commodity of commerce suitable for substantial non-  
 18 infringing uses because, among other things, the components sent to users are uniquely designed  
 19 only to access the infringing aspects of Zillow's website and mobile applications.

20       212. On information and belief, despite their knowledge of the infringement of the '789  
 21 patent, Zillow Group and Zillow, Inc. have intended and continue to intend to induce patent  
 22 infringement by third parties, including at least the direct infringement by end users and customer,  
 23 as described in this section. Zillow has and continues to encourage and instruct customers and end  
 24 users to use Zillow's website and the associated mobile applications in a manner that infringes the  
 25 '789 patent by advertising the website and mobile applications, providing customer support, and

1 designing their website and mobile applications in such a way that the use of the website and mobile  
 2 applications by an end user or customer infringes the '789 patent.

3       213. For example, Zillow has encouraged and continues to encourage and instruct  
 4 customers and end users to use Zillow's website and the associated mobile applications in an  
 5 infringing manner by providing customer support and designing their website and mobile  
 6 applications in such a way that the use of the website and mobile applications by an end user or  
 7 customer infringes the Patents-in-Suit. For example, on information and belief, Zillow's customer  
 8 service encourages and supports customers and end users in their use of Zillow's website and the  
 9 associated mobile applications in an infringing manner. For another example,  
 10 <https://zillow.zendesk.com/hc/en-us> provides direction and support for Zillow's website. On  
 11 information and belief, to the extent Zillow was not aware that they were encouraging their  
 12 customers and end users to infringe the '789 patent, its lack of knowledge was based on being  
 13 willfully blind to the possibility that their acts would cause infringement.

14       214. IBM has been damaged by the infringement of its '789 patent by Zillow and will  
 15 continue to be damaged by such infringement. IBM is entitled to recover from Zillow the damages  
 16 sustained by IBM as a result of Zillow's wrongful acts.

17       215. The infringement by Zillow of the '789 patent was, and continues to be, deliberate  
 18 and willful, entitling IBM to increased damages under 35 U.S.C. § 284 and to attorney fees and costs  
 19 incurred in prosecuting this action under 35 U.S.C. § 285. In committing these acts of infringement,  
 20 Zillow actually knew or should have known that its actions constituted an unjustifiably high risk of  
 21 infringement of a valid and enforceable patent.

22       216. IBM has suffered and continues to suffer irreparable harm, for which there is no  
 23 adequate remedy at law, and will continue to do so unless Zillow is enjoined therefrom by this Court.  
 24 In committing these acts of infringement, Zillow actually knew or should have known that their  
 25 actions constituted an unjustifiably high risk of infringement of a valid and enforceable patent.

1        217. Zillow alleges that it does not infringe the claims of the '789 patent because the patent  
2 claims a specific way of solving a technical problem that Zillow alleges it does not perform through  
3 its website and/or mobile applications. *See* Exhibit 95, Appendices 6, 10. Although IBM disagrees  
4 with Zillow's contentions, those contentions demonstrate that Zillow agrees that the invention of the  
5 '789 patent teaches a particular way to solve a specific technical problem.

## COUNT FIVE

## **INFRINGEMENT OF THE '389 PATENT**

218. IBM incorporates by reference paragraphs 1-217.

9        219. IBM is the owner of all right, title and interest in the '389 patent. The '389 patent  
10 was duly and properly issued by the USPTO on March 6, 2007. The '389 patent was duly assigned  
11 to IBM. A copy of the '389 patent is attached hereto as Exhibit 58.

220. The '389 patent is valid and enforceable.

13        221. In violation of 35 U.S.C. § 271, Zillow has infringed, contributed to the infringement  
14 of, and/or induced others to infringe one or more of the claims of the '389 patent by having made,  
15 designed, offered for sale, sold, provided, used, maintained, and/or supported their website,  
16 including at least [www.zillow.com](http://www.zillow.com), [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the  
17 associated mobile applications, including the Zillow applications for mobile devices running on, for  
18 example, the Apple iOS and Google Android operating systems, including at least Zillow Real Estate  
19 & Rentals, Zillow Rentals, and Zillow Premier Agent applications. Zillow's infringement is  
20 continuing.

21        222. Zillow Group “operates the largest portfolio of real estate and home-related brands  
22 on mobile and the web which focus on all stages of the home lifecycle: renting, buying, selling and  
23 financing. . . . The Zillow Group portfolio of consumer brands includes Zillow . . . .”<sup>38</sup> Zillow  
24 Group’s “technology solutions” and actions related to such technology infringe, direct or control

<sup>38</sup> Ex. 4 (Zillow Group 2018 10-K) at 3.

1 infringement, induce infringement, and/or contribute to the infringement through the website and  
 2 through the mobile application instrumentalities.

3       223. Zillow, Inc. owns and operates the Zillow website, including at least  
 4 www.zillow.com, www.zillowgroupmedia.com, and subdomains thereof, and the Zillow mobile  
 5 applications on, for example, the iOS and Android operating systems. Zillow, Inc. provides online  
 6 real estate listings and related services to consumers and local real estate agents through the website  
 7 and mobile application instrumentalities.

8       224. Zillow Group and Zillow, Inc. directly infringe one or more claims of the '389 patent,  
 9 including claims 1-6 and 8-17, as described below and in Exhibit 94, Exs. H-L. Additionally, Zillow  
 10 Group directs and controls the infringing behavior of its agent, Zillow, Inc., which Zillow Group  
 11 operates and wholly owns.

12       225. For example, as shown in Exhibit 59, the Zillow website and Zillow mobile  
 13 applications infringe at least claim 1 of the '389 patent at least by:

14           a. selecting one or more objects to be displayed in a plurality of layers;  
 15           b. identifying a plurality of non-spatially distinguishable display attributes,  
 16 wherein one or more of the non-spatially distinguishable display attributes corresponds to each of  
 17 the layers;

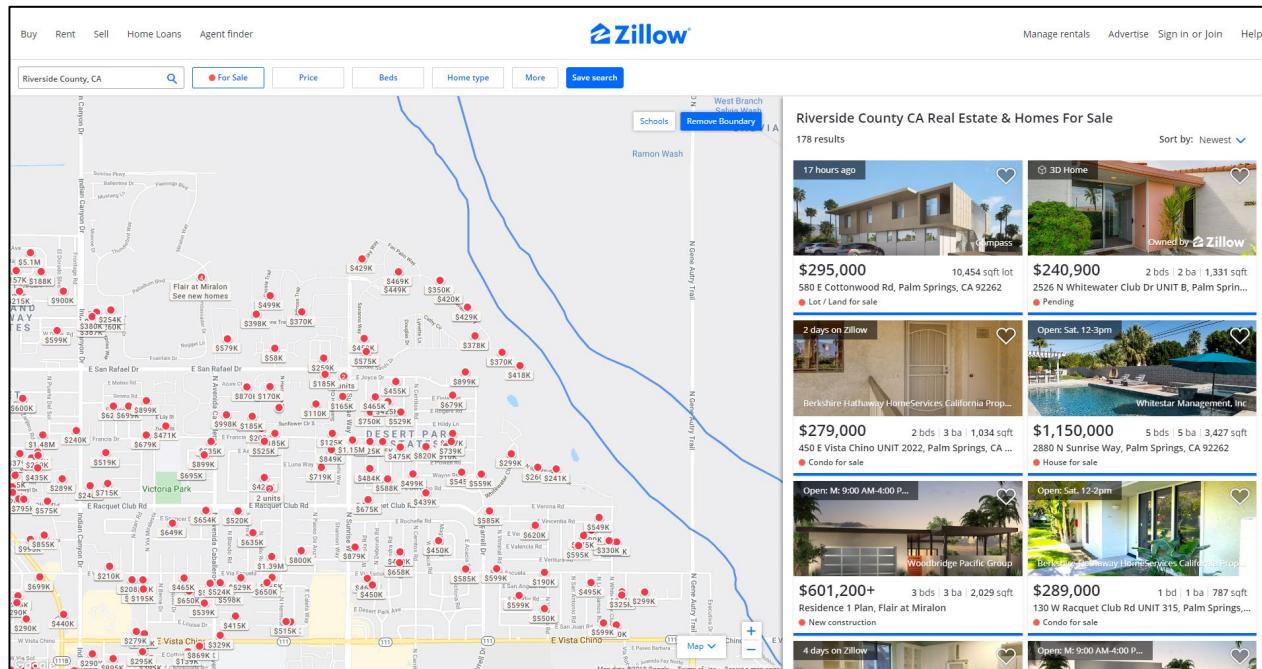
18           c. matching each of the objects to one of the layers;  
 19           d. applying the non-spatially distinguishable display attributes corresponding to  
 20 the layer for each of the matched objects;

21           e. determining a layer order for the plurality of layers, wherein the layer order  
 22 determines a display emphasis corresponding to the objects from the plurality of objects in the  
 23 corresponding layers; and

24           f. displaying the objects with the applied non-spatially distinguishable display  
 25 attributes based upon the determination, wherein the objects in a first layer from the plurality of

1 layers are visually distinguished from the objects in the other plurality of layers based upon the non-  
 2 spatially distinguishable display attributes of the first layer.

3 226. For another example, Zillow Group and Zillow, Inc. infringe at least claim 1 of the  
 4 '389 patent through Zillow's website and mobile applications in a similar manner to that shown in  
 5 the Exhibit 59 claim chart at least when the objects are properties from, or involving, Zillow Group  
 6 Media; when the objects are properties Zillow owns through Zillow Offers; and when the objects  
 7 are properties, for example, properties from Promoted Communities for new constructions,  
 8 properties managed by or associated with Premier Agent, and other properties promoted using  
 9 Zillow's advertising services.



21 Ex. 44 (Zillow search in Riverside County, CA).  
 22  
 23  
 24  
 25



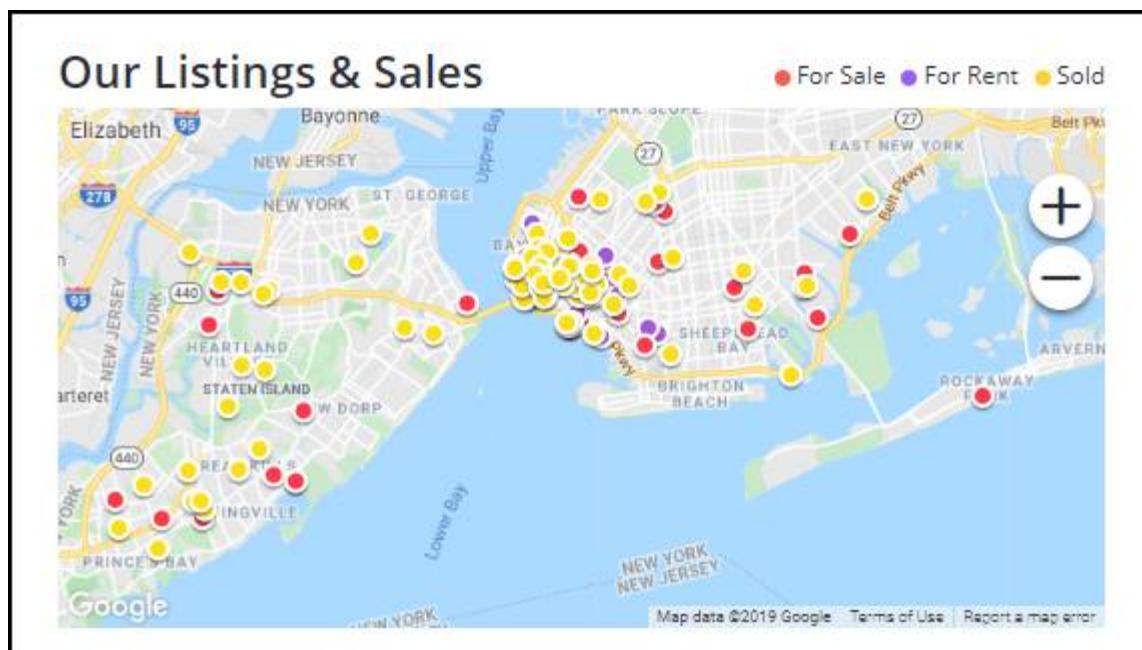
11 Ex. 45 (<https://www.zillow.com/resources/new-construction/training/inline-community-preview/>).

12

13

14

227. For another example, Zillow Group and Zillow, Inc. infringe at least claim 1 of the  
 '389 patent through the Premier Agent service in at least a similar manner to that shown in the  
 Exhibit 59 claim chart:



Ex. 60 (<https://www.zillow.com/profile/Charles-Fabbella/>).

1       228. The Zillow mobile applications, including at least the Zillow Real Estate & Rentals,  
 2 Zillow Rentals, and Zillow Premier Agent applications, infringe at least claim 1 of the '389 patent  
 3 in a similar manner as through the website.

4       229. Alternatively, to the extent that any step of claim 1 of the '389 patent, including the  
 5 "selecting" or "determining" steps, is performed by a third party (in addition to and/or separate from  
 6 Zillow's performance), such as a user, browser, or mobile operating system, that performance is  
 7 attributable to Zillow, Inc. and Zillow Group at least because each Zillow entity has an agency and/or  
 8 contractual relationship with said third party and each Zillow entity controls and/or directs the  
 9 performance of said third party. For example, each Zillow entity controls and/or directs the  
 10 performance of the "selecting" step by users, browsers, and mobile operating systems because it, for  
 11 example, conditions receipt of a benefit, such as the ability for users to search for and receive  
 12 property listings on a map on Zillow's website and mobile applications, on the performance of the  
 13 claimed steps, and establishes the manner or timing of the performance by, for example, determining  
 14 what type of properties are to be returned in a search. For another example, each Zillow entity  
 15 controls and/or directs the performance of the "selecting" step by users, browsers, and mobile  
 16 operating systems because it profits from the performance by, for example, increasing use and user  
 17 interactions from improved search functionality, and each Zillow entity has the right to stop or limit  
 18 infringement, by, for example, not sending search results requested by the user in this manner.

19       230. Alternatively, to the extent any step of claim 1 of the '389 patent, including the  
 20 "selecting" or "determining" steps, is performed by a third party (in addition to and/or separate from  
 21 Zillow's performance), such as a Content Delivery Network ("CDN") or other server, including  
 22 Amazon CloudFront, that performance is attributable to Zillow, Inc. and Zillow Group at least  
 23 because each Zillow entity has an agency and/or contractual relationship with said third party and  
 24 each Zillow entity controls and/or directs the performance of said third party. For example, each  
 25 Zillow entity controls and/or directs the performance of the "selecting" step by CDNs because it, for

1 example, conditions receipt of a benefit, such as payment for services, on the performance of the  
 2 claimed steps, and establishes the manner or timing of the performance by, for example, determining  
 3 what type of properties are to be returned in a search. For another example, each Zillow entity  
 4 controls and/or directs the performance of the “selecting” step by CDNs because it profits from the  
 5 performance by, for example, increasing use and user interactions from improved search  
 6 functionality, and each Zillow entity has the right to stop or limit infringement, by, for example, not  
 7 sending search results requested by the user in this manner.

8       231. Zillow Group and Zillow, Inc. have had knowledge of the '389 patent and their  
 9 alleged direct and indirect infringement since January 14, 2019.

10       232. Zillow Group and Zillow, Inc. also indirectly infringe one or more claims of the '389  
 11 patent through the Zillow website, including at least [www.zillow.com](http://www.zillow.com),  
 12 [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the Zillow mobile applications. On  
 13 information and belief, in certain circumstances, client devices and software (e.g., devices and  
 14 software used by end users and customers of Zillow's website and the associated mobile  
 15 applications) directly infringe the '389 patent through the use of the website and mobile applications  
 16 to view at least real estate listings. Zillow Group's Annual Report lists \$1,333,554,000 of revenue  
 17 from its website and mobile applications which “generate revenue from the sale of advertising  
 18 services and our suite of marketing software and technology solutions.”<sup>39</sup> The revenue indicates that  
 19 numerous end users and customers used Zillow's website and the associated mobile applications in  
 20 order to view real estate listings and thereby infringe the '389 patent. In particular, to the extent  
 21 Zillow does not perform the method steps, in certain circumstances, client devices and software (e.g.,  
 22 devices and software used by end users and customers of Zillow's website and the associated mobile  
 23 applications) perform at least the method of displaying layered data recited by claim 1 of the '389  
 24 patent as shown in Exhibit 59.

25 <sup>39</sup> Ex. 4 (Zillow Group 2018 10-K) at 3, 42.

1       233. On information and belief, despite knowledge of the infringement of the '389 patent,  
 2 Zillow Group and Zillow, Inc. have intended and continue to intend to contribute to patent  
 3 infringement by third parties by selling, offering to sell, and/or supplying components, and/or a  
 4 material or apparatus for use in practicing the patented methods of the '389 patent by at least end  
 5 users and consumers, as described in this section.

6       234. For example Zillow Group and Zillow Inc. provide computer code underlying the  
 7 Zillow website and mobile applications, such as HTML, JavaScript, and image files, to customers  
 8 and end users for use in infringing the '389 patent and such computer code does not have substantial  
 9 non-infringing uses. Such computer code is especially made and/or especially adapted for use in  
 10 infringing the '389 patent and is not a staple article or commodity of commerce suitable for  
 11 substantial non-infringing use. The only substantial use of Zillow's computer code responses is for  
 12 the claimed subject matter involving displaying layered data as described in the '389 patent.

13       235. Further, on information and belief, as a part of providing said computer code, Zillow  
 14 Group and Zillow, Inc. enter into binding contracts with end users and customers to use Zillow's  
 15 website and mobile applications, including in an infringing manner including by binding the users  
 16 to a terms of use for the accused website and mobile applications. On information and belief, Zillow  
 17 Group and Zillow, Inc. receive valuable consideration from customers and end users located in this  
 18 judicial district, including information provided by customers and end users, and/or information  
 19 automatically collected from customers and end users. When customers and end users in this judicial  
 20 district use the accused website and/or mobile applications, Zillow Group and Zillow, Inc. collect  
 21 information about the customers and end users, their devices, and their interaction with the accused  
 22 website and the associated mobile applications. Zillow Group and Zillow, Inc. work with service  
 23 providers and advertising networks to track and manage cookie information and activities of  
 24 customers and end users across different websites and devices. Third parties use cookie information  
 25 collected by Zillow Group and Zillow, Inc. to deliver advertisements to end users and customers

1 based on their use of the accused website and mobile applications. Zillow Group and Zillow, Inc.'s  
 2 business is primarily funded through advertising. The applications and website are especially made  
 3 and/or especially adapted for use in infringing the Patents-in-Suit, at least as detailed in the individual  
 4 Counts above, and are not a staple article or commodity of commerce suitable for substantial non-  
 5 infringing uses because, among other things, the components sent to users are uniquely designed  
 6 only to access the infringing aspects of Zillow's website and mobile applications.

7 236. On information and belief, despite their knowledge of the infringement of the '389  
 8 patent, Zillow Group and Zillow, Inc. have intended and continue to intend to induce patent  
 9 infringement by third parties, including at least the direct infringement by end users and customer,  
 10 as described in this section. Zillow has and continues to encourage and instruct customers and end  
 11 users to use Zillow's website and the associated mobile applications in a manner that infringes the  
 12 '389 patent by advertising the website and mobile applications, providing customer support, and  
 13 designing their website and mobile applications in such a way that the use of the website and mobile  
 14 applications by an end user or customer infringes the '389 patent.

15 237. For example, Zillow has encouraged and continues to encourage and instruct  
 16 customers and end users to use Zillow's website and the associated mobile applications in an  
 17 infringing manner by providing customer support and designing their website and mobile  
 18 applications in such a way that the use of the website and mobile applications by an end user or  
 19 customer infringes the Patents-in-Suit. For example, on information and belief, Zillow's customer  
 20 service encourages and supports customers and end users in their use of Zillow's website and the  
 21 associated mobile applications in an infringing manner. For another example,  
 22 <https://zillow.zendesk.com/hc/en-us> provides direction and support for Zillow's website. On  
 23 information and belief, to the extent Zillow was not aware that they were encouraging their  
 24 customers and end users to infringe the '389 patent, its lack of knowledge was based on being  
 25 willfully blind to the possibility that their acts would cause infringement.

1        238. IBM has been damaged by the infringement of its '389 patent by Zillow and will  
2 continue to be damaged by such infringement. IBM is entitled to recover from Zillow the damages  
3 sustained by IBM as a result of Zillow's wrongful acts.

4        239. The infringement by Zillow of the '389 patent was, and continues to be, deliberate  
5 and willful, entitling IBM to increased damages under 35 U.S.C. § 284 and to attorney fees and costs  
6 incurred in prosecuting this action under 35 U.S.C. § 285. In committing these acts of infringement,  
7 Zillow actually knew or should have known that its actions constituted an unjustifiably high risk of  
8 infringement of a valid and enforceable patent.

9       240. IBM has suffered and continues to suffer irreparable harm, for which there is no  
10      adequate remedy at law, and will continue to do so unless Zillow is enjoined therefrom by this Court.  
11      In committing these acts of infringement, Zillow actually knew or should have known that its actions  
12      constituted an unjustifiably high risk of infringement of a valid and enforceable patent.

13        241. Zillow alleges that it does not infringe the claims of the '389 patent because the patent  
14 claims a specific way of solving a technical problem that Zillow alleges it does not perform through  
15 its website and/or mobile applications. *See* Exhibit 95, Appendices 3, 9. Although IBM disagrees  
16 with Zillow's contentions, those contentions demonstrate that Zillow agrees that the invention of the  
17 '389 patent teaches a particular way to solve a specific technical problem.

## **COUNT SIX**

## **INFRINGEMENT OF THE '443 PATENT**

20 242. IBM incorporates by reference paragraphs 1-241.

21        243. IBM is the owner of all right, title and interest in the '443 patent. The '443 patent  
22 was duly and properly issued by the USPTO on July 11, 2006. The '443 patent was duly assigned  
23 to IBM. A copy of the '443 patent is attached hereto as Exhibit 61.

244. The '443 patent is valid and enforceable.

1       245. In violation of 35 U.S.C. § 271, Zillow has infringed, contributed to the infringement  
 2 of, and/or induced others to infringe one or more of the claims of the '443 patent by having made,  
 3 designed, offered for sale, sold, provided, used, maintained, and/or supported their website,  
 4 including at least [www.zillow.com](http://www.zillow.com), [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the  
 5 associated mobile applications, including the Zillow applications for mobile devices running on, for  
 6 example, the Apple iOS and Google Android operating systems, including at least Zillow Real Estate  
 7 & Rentals, Zillow Rentals, and Zillow Premier Agent applications. Zillow's infringement is  
 8 continuing.

9       246. Zillow Group "operates the largest portfolio of real estate and home-related brands  
 10 on mobile and the web which focus on all stages of the home lifecycle: renting, buying, selling and  
 11 financing. . . . The Zillow Group portfolio of consumer brands includes Zillow . . . ."<sup>40</sup> Zillow  
 12 Group's "technology solutions" and actions related to such technology infringe, direct or control  
 13 infringement, induce infringement, and/or contribute to the infringement through the website and  
 14 through the mobile application instrumentalities.

15       247. Zillow, Inc. owns and operates the Zillow website, including at least  
 16 [www.zillow.com](http://www.zillow.com), [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the Zillow mobile  
 17 applications on, for example, the iOS and Android operating systems. Zillow, Inc. provides online  
 18 real estate listings and related services to consumers and local real estate agents through the website  
 19 and mobile application instrumentalities.

20       248. Zillow Group and Zillow, Inc. directly infringe one or more claims of the '443 patent,  
 21 including claims 1-7, 9-17, and 19-20, as described below and in Exhibit 94, Exs. F-G. Additionally,  
 22 Zillow Group directs and controls the infringing behavior of its agent, Zillow, Inc., which Zillow  
 23 Group operates and wholly owns.

24

25       

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<sup>40</sup> Ex. 4 (Zillow Group 2018 10-K) at 3.

1           249. For example, as shown in Exhibit 62, the Zillow website and Zillow mobile  
 2 applications infringe at least claim 1 of the '443 patent at least by:

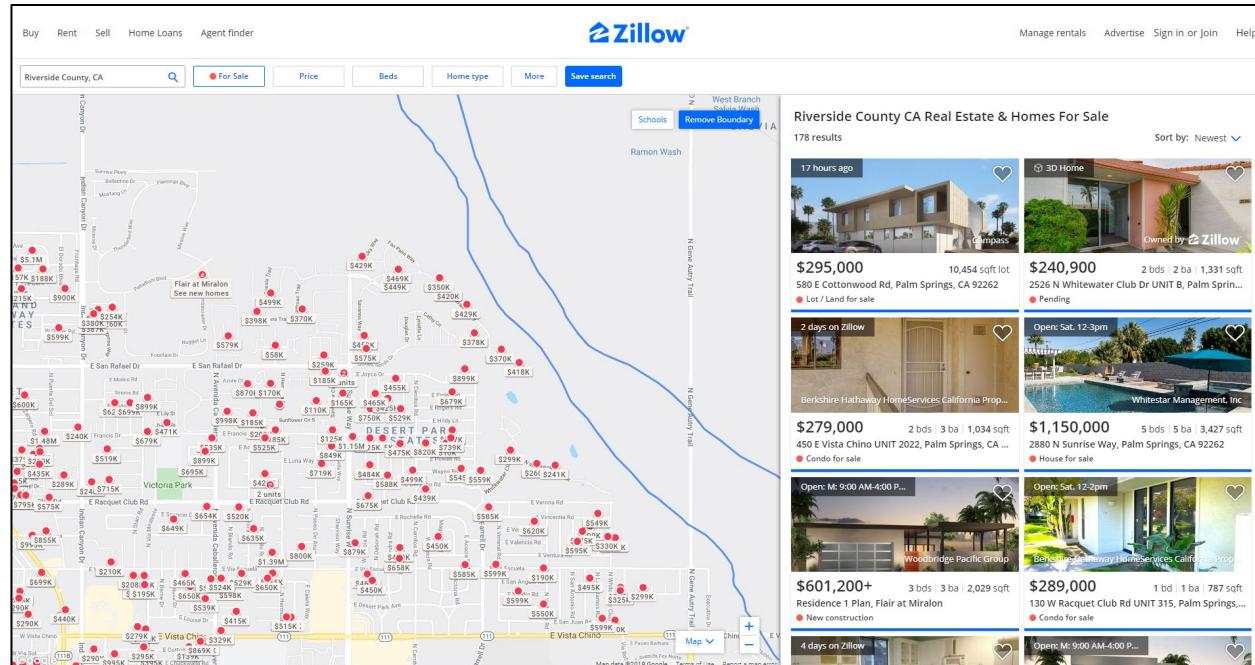
3               a. identifying at least one search result item from a search result of said Internet  
 4 search by said user;

5               b. searching for said at least one associated advertisement within said repository  
 6 using said at least one search result item;

7               c. identifying said at least one associated advertisement from said repository  
 8 having at least one word that matches said at least one search result item; and

9               d. correlating said at least one associated advertisement with said at least one  
 10 search result item.

11           250. For another example, Zillow Group and Zillow, Inc. infringe at least claim 1 of the  
 12 '443 patent through Zillow's website and mobile applications in a similar manner to that shown in  
 13 the Exhibit 62 claim chart at least when the advertising is from, or involves, Zillow Group Media;  
 14 when the advertising is for properties Zillow owns through Zillow Offers; and when the advertising  
 15 is for other advertised properties, such as Promoted Communities for new constructions, properties  
 16 managed by or associated with Premier Agent, and other properties promoted using Zillow's  
 17 advertising services.



Ex. 44 (Zillow search in Riverside County, CA).

Ex. 45 (<https://www.zillow.com/resources/new-construction/training/inline-community-preview/>).

1       251. The Zillow mobile applications, including at least the Zillow Real Estate & Rentals,  
 2 Zillow Rentals, and Zillow Premier Agent applications, infringe at least claim 1 of the '443 patent  
 3 in a similar manner as through the website.

4       252. Alternatively, to the extent that any step of claim 1 of the '443 patent, including the  
 5 "identifying" step, is performed by a third party (in addition to and/or separate from Zillow's  
 6 performance), such as a user, browser, or mobile operating system, that performance is attributable  
 7 to Zillow, Inc. and Zillow Group at least because each Zillow entity has an agency and/or contractual  
 8 relationship with said third party and each Zillow entity controls and/or directs the performance of  
 9 said third party. For example, each Zillow entity controls and/or directs the performance of the  
 10 "identifying" step by users, browsers, and mobile operating systems because it, for example,  
 11 conditions receipt of a benefit, such as receiving personalized advertisements, on the performance  
 12 of the claimed steps, and establishes the manner or timing of the performance by, for example,  
 13 determining which advertisements are associated with which search result items. For another  
 14 example, each Zillow entity controls and/or directs the performance of the "identifying" step by  
 15 users, browsers, and mobile operating systems because it profits from the performance by, for  
 16 example, increasing use and user interactions from improved targeting of advertisements, and each  
 17 Zillow entity has the right to stop or limit infringement, by, for example, removing this feature from  
 18 the Zillow website and applications.

19       253. Alternatively, to the extent any step of claim 1 of the '443 patent, including the  
 20 "identifying" step, is performed by a third party (in addition to and/or separate from Zillow's  
 21 performance), such as a Content Delivery Network ("CDN") or other server, including Amazon  
 22 CloudFront, that performance is attributable to Zillow, Inc. and Zillow Group at least because each  
 23 Zillow entity has an agency and/or contractual relationship with said third party and each Zillow  
 24 entity controls and/or directs the performance of said third party. For example, each Zillow entity  
 25 controls and/or directs the performance of the "identifying" step by CDNs because it, for example,

1 conditions receipt of a benefit, such as payment for services, on the performance of the claimed  
 2 steps, and establishes the manner or timing of the performance by, for example, determining which  
 3 advertisements are associated with which search result items. For another example, each Zillow  
 4 entity controls and/or directs the performance of the “identifying” step by CDNs because it profits  
 5 from the performance by, for example, increasing use and user interactions from improved targeting  
 6 of advertisements, and each Zillow entity has the right to stop or limit infringement, by, for example,  
 7 removing this feature from the Zillow website and applications.

8       254. Zillow Group and Zillow, Inc. have had knowledge of the '443 patent and its alleged  
 9 direct and indirect infringement since August 26, 2019.

10       255. Zillow Group and Zillow, Inc. also indirectly infringe one or more claims of the '443  
 11 patent through the Zillow website, including at least [www.zillow.com](http://www.zillow.com),  
 12 [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the Zillow mobile applications. On  
 13 information and belief, in certain circumstances, client devices and software (e.g., devices and  
 14 software used by end users and customers of Zillow's website and the associated mobile  
 15 applications) directly infringe the '443 patent through the use of the website and mobile applications  
 16 to view at least real estate listings. Zillow Group's Annual Report lists \$1,333,554,000 of revenue  
 17 from its website and mobile applications which “generate revenue from the sale of advertising  
 18 services and our suite of marketing software and technology solutions.”<sup>41</sup> The revenue indicates that  
 19 numerous end users and customers used Zillow's website and the associated mobile applications in  
 20 order to view real estate listings and thereby infringe the '443 patent. In particular, to the extent  
 21 Zillow does not perform the method steps, in certain circumstances, client devices and software (e.g.,  
 22 devices and software used by end users and customers of Zillow's website and the associated mobile  
 23 applications) perform at least the method of targeting associated advertisements recited by claim 1  
 24 of the '443 patent as shown in Exhibit 62.

25<sup>41</sup> Ex. 4 (Zillow Group 2018 10-K) at 3, 42.

1 256. On information and belief, despite knowledge of the infringement of the '443 patent,  
 2 Zillow Group and Zillow, Inc. have intended and continue to intend to contribute to patent  
 3 infringement by third parties by selling, offering to sell, and/or supplying components, and/or a  
 4 material or apparatus for use in practicing the patented methods of the '443 patent by at least end  
 5 users and consumers, as described in this section.

6 257. For example Zillow Group and Zillow Inc. provide computer code underlying the  
 7 Zillow website and mobile applications, such as HTML, JavaScript, and image files, to customers  
 8 and end users for use in infringing the '443 patent and such computer code does not have substantial  
 9 non-infringing uses. Such computer code is especially made and/or especially adapted for use in  
 10 infringing the '443 patent and is not a staple article or commodity of commerce suitable for  
 11 substantial non-infringing use. The only substantial use of Zillow's computer code responses is for  
 12 the claimed subject matter involving targeting associated advertisements as described in the '443  
 13 patent.

14 258. Further, on information and belief, as a part of providing said computer code, Zillow  
 15 Group and Zillow, Inc. enter into binding contracts with end users and customers to use Zillow's  
 16 website and mobile applications, including in an infringing manner including by binding the users  
 17 to a terms of use for the accused website and mobile applications. On information and belief, Zillow  
 18 Group and Zillow, Inc. receive valuable consideration from customers and end users located in this  
 19 judicial district, including information provided by customers and end users, and/or information  
 20 automatically collected from customers and end users. When customers and end users in this judicial  
 21 district use the accused website and/or mobile applications, Zillow Group and Zillow, Inc. collect  
 22 information about the customers and end users, their devices, and their interaction with the accused  
 23 website and the associated mobile applications. Zillow Group and Zillow, Inc. work with service  
 24 providers and advertising networks to track and manage cookie information and activities of  
 25 customers and end users across different websites and devices. Third parties use cookie information

1 collected by Zillow Group and Zillow, Inc. to deliver advertisements to end users and customers  
 2 based on their use of the accused website and mobile applications. Zillow Group and Zillow, Inc.'s  
 3 business is primarily funded through advertising. The applications and website are especially made  
 4 and/or especially adapted for use in infringing the Patents-in-Suit, at least as detailed in the individual  
 5 Counts above, and are not a staple article or commodity of commerce suitable for substantial non-  
 6 infringing uses because, among other things, the components sent to users are uniquely designed  
 7 only to access the infringing aspects of Zillow's website and mobile applications.

8       259. On information and belief, despite their knowledge of the infringement of the '443  
 9 patent, Zillow Group and Zillow, Inc. have intended and continue to intend to induce patent  
 10 infringement by third parties, including at least the direct infringement by end users and customer,  
 11 as described in this section. Zillow has and continues to encourage and instruct customers and end  
 12 users to use Zillow's website and the associated mobile applications in a manner that infringes the  
 13 '443 patent by advertising the website and mobile applications, providing customer support, and  
 14 designing their website and mobile applications in such a way that the use of the website and mobile  
 15 applications by an end user or customer infringes the '443 patent.

16       260. For example, Zillow has encouraged and continues to encourage and instruct  
 17 customers and end users to use Zillow's website and the associated mobile applications in an  
 18 infringing manner by providing customer support and designing their website and mobile  
 19 applications in such a way that the use of the website and mobile applications by an end user or  
 20 customer infringes the Patents-in-Suit. For example, on information and belief, Zillow's customer  
 21 service encourages and supports customers and end users in their use of Zillow's website and the  
 22 associated mobile applications in an infringing manner. For another example,  
 23 <https://zillow.zendesk.com/hc/en-us> provides direction and support for Zillow's website. As of  
 24 November 11, 2019, Zillow continues to instructs its customers and end users to view related listings  
 25 on the accused website without having to return to the search page or select filters in a way that

1 infringes at least claim 1 of the '443 patent.<sup>42</sup> On information and belief, to the extent Zillow was  
2 not aware that they were encouraging their customers and end users to infringe the '443 patent, its  
3 lack of knowledge was based on being willfully blind to the possibility that their acts would cause  
4 infringement.

5        261. IBM has been damaged by the infringement of its '443 patent by Zillow and will  
6 continue to be damaged by such infringement. IBM is entitled to recover from Zillow the damages  
7 sustained by IBM as a result of Zillow's wrongful acts.

8        262. The infringement by Zillow of the '443 patent was, and continues to be, deliberate  
9 and willful, entitling IBM to increased damages under 35 U.S.C. § 284 and to attorney fees and costs  
10 incurred in prosecuting this action under 35 U.S.C. § 285. In committing these acts of infringement,  
11 Zillow actually knew or should have known that its actions constituted an unjustifiably high risk of  
12 infringement of a valid and enforceable patent.

13        263. IBM has suffered and continues to suffer irreparable harm, for which there is no  
14 adequate remedy at law, and will continue to do so unless Zillow is enjoined therefrom by this Court.  
15 In committing these acts of infringement, Zillow actually knew or should have known that their  
16 actions constituted an unjustifiably high risk of infringement of a valid and enforceable patent.

17        264. Zillow alleges that it does not infringe the claims of the '443 patent because the patent  
18 claims a specific way of solving a technical problem that Zillow alleges it does not perform through  
19 its website and/or mobile applications. *See* Exhibit 95, Appendix 2. Although IBM disagrees with  
20 Zillow's contentions, those contentions demonstrate that Zillow agrees that the invention of the '443  
21 patent teaches a particular way to solve a specific technical problem.

## COUNT SEVEN

## **INFRINGEMENT OF THE '904 PATENT**

265. IBM incorporates by reference paragraphs 1-264.

<sup>42</sup> Ex. 63 (<https://www.zillow.com/tech/embedding-similar-home-recommendation/>).

1       266. IBM is the owner of all right, title and interest in the '904 patent. The '904 patent  
 2 was duly and properly issued by the USPTO on Nov. 20, 2012. The '904 patent was duly assigned  
 3 to IBM. A copy of the '904 patent is attached hereto as Exhibit 64.

4       267. The '904 patent is valid and enforceable.

5       268. In violation of 35 U.S.C. § 271, Zillow has infringed, contributed to the infringement  
 6 of, and/or induced others to infringe one or more of the claims of the '904 patent by having made,  
 7 designed, offered for sale, sold, provided, used, maintained, and/or supported its website, including  
 8 at least [www.zillow.com](http://www.zillow.com), [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the associated  
 9 mobile applications, including the Zillow applications for mobile devices running on, for example,  
 10 the Apple iOS and Google Android operating systems, including at least Zillow Real Estate &  
 11 Rentals, Zillow Rentals, and Zillow Premier Agent applications. Zillow's infringement is  
 12 continuing.

13       269. Zillow Group "operates the largest portfolio of real estate and home-related brands  
 14 on mobile and the web which focus on all stages of the home lifecycle: renting, buying, selling and  
 15 financing. . . . The Zillow Group portfolio of consumer brands includes Zillow . . . ."<sup>43</sup> Zillow  
 16 Group's "technology solutions" and actions related to such technology infringe, direct or control  
 17 infringement, induce infringement, and/or contribute to the infringement through the website and  
 18 through the mobile application instrumentalities.

19       270. Zillow, Inc. owns and operates the Zillow website, including at least  
 20 [www.zillow.com](http://www.zillow.com), [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the Zillow mobile  
 21 applications on, for example, the iOS and Android operating systems. Zillow, Inc. provides online  
 22 real estate listings and related services to consumers and local real estate agents through the website  
 23 and mobile application instrumentalities.

24

25       

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<sup>43</sup> Ex. 4 (Zillow Group 2018 10-K) at 3.

1       271. Zillow Group and Zillow, Inc. directly infringe one or more claims of the '904 patent,  
 2 including claims 1-5 and 7-10, as described below and in Exhibit 94, Exs. M-N. Additionally, Zillow  
 3 Group directs and controls the infringing behavior of its agent, Zillow, Inc., which Zillow Group  
 4 operates and wholly owns.

5       272. For example, as shown in Exhibit 65, the Zillow website and Zillow mobile  
 6 applications infringe at least claim 1 of the '904 patent at least by:

7           a. producing, by one or more computers, a promotion list for a promotion  
 8 management campaign by:

9           b. generating, by one or more computers, a promotion instance from a promotion  
 10 template;

11           c. receiving, by one or more computers executing marketing campaign software,  
 12 a search query that includes one or more attributes of a promotion instance;

13           d. searching one or more data repositories for promotion instances having  
 14 attributes corresponding to the attributes specified in the search query;

15           e. returning a list including one or more promotion instances having the  
 16 attributes corresponding to the attributes specified in the search query;

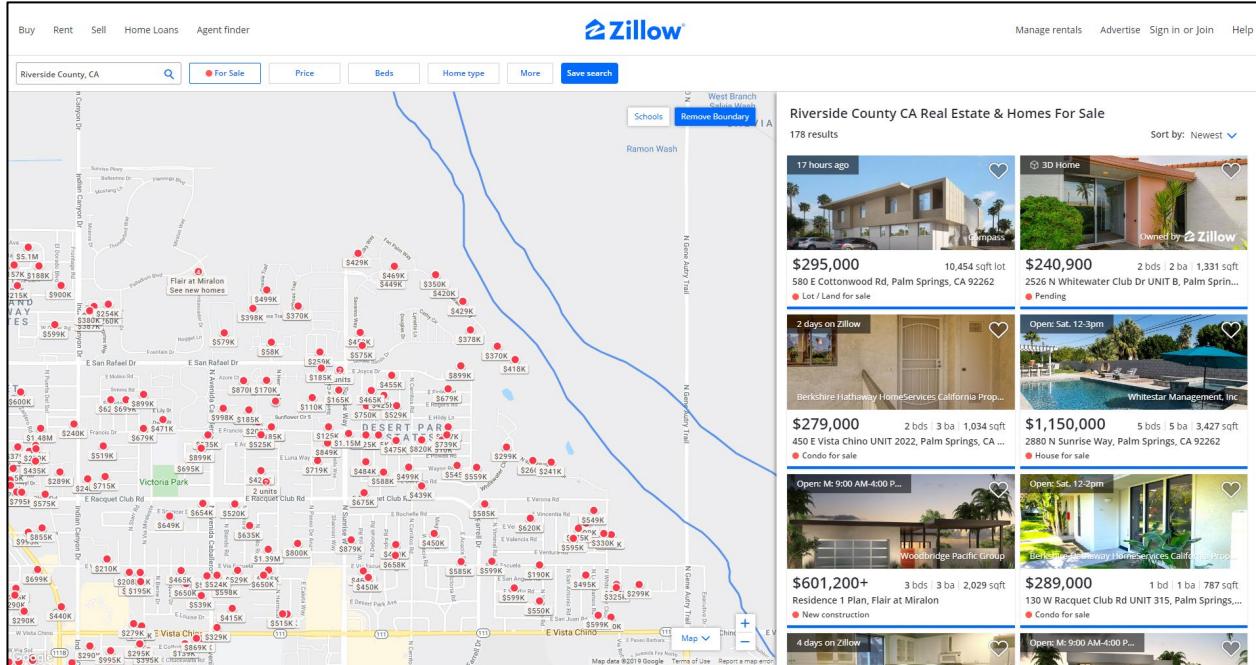
17           f. receiving, by the one or more computers, a selection of one or more promotion  
 18 instances, from the returned list, to be included in the promotion list;

19           g. assigning the selected promotion instances to the promotions list; and

20           h. storing the promotion list in an electronic medium.

21       273. For another example, Zillow Group and Zillow, Inc. infringe at least claim 1 of the  
 22 '904 patent through Zillow's website and mobile applications in a similar manner to that shown in  
 23 the Exhibit 65 claim chart at least when the advertising is from, or involves, Zillow Group Media;  
 24 when the advertising is for properties Zillow owns through Zillow Offers; and when the advertising  
 25 is for other advertised properties, such as Promoted Communities for new constructions, properties

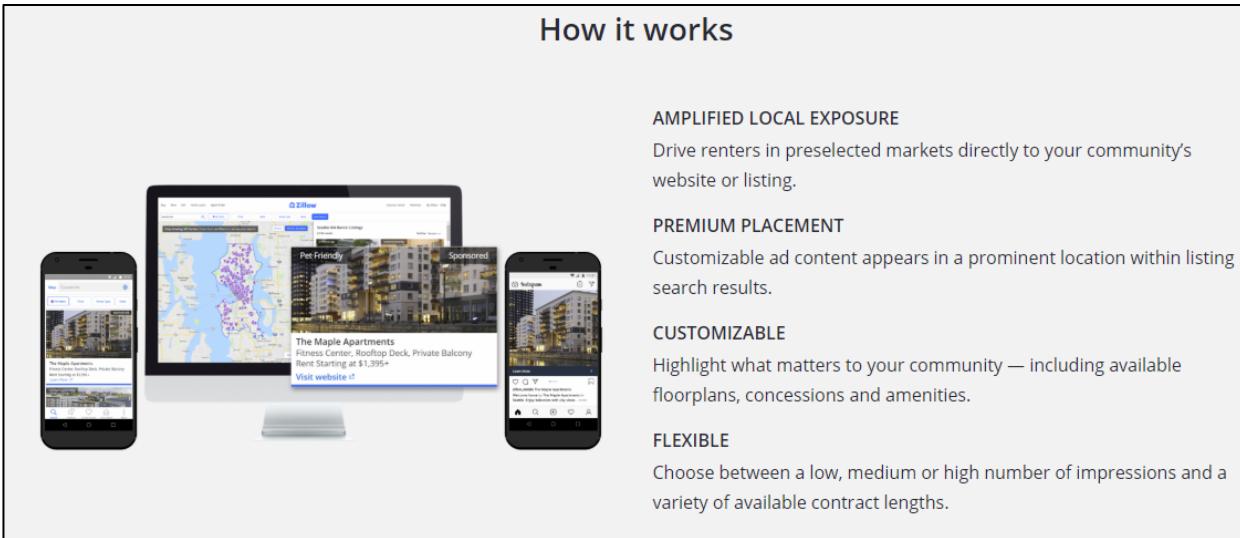
1 managed by or associated with Premier Agent, and other properties promoted using Zillow's  
 2 advertising services.



Ex. 44 (Zillow search in Riverside County, CA).



Ex. 45 (<https://www.zillow.com/resources/new-construction/training/inline-community-preview/>).



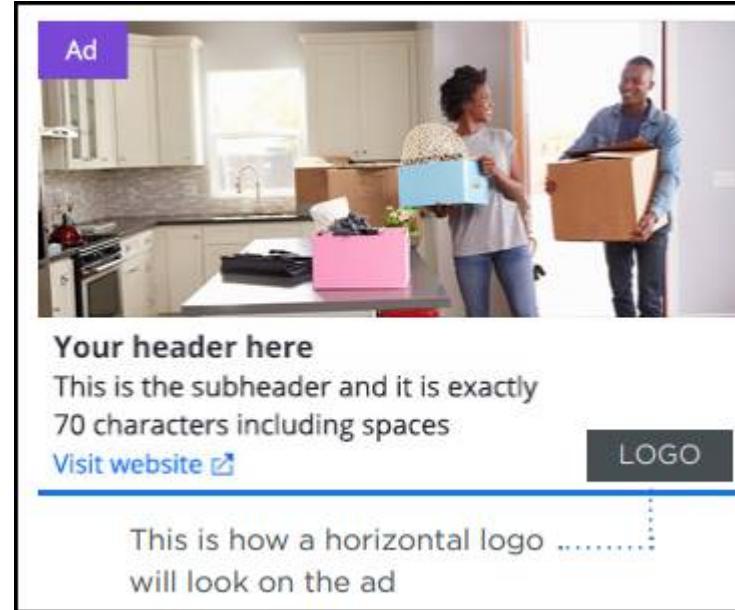
Ex. 46 (<https://www.zillow.com/marketing/rental-property-advertising/>).

274. For another example, Zillow Group and Zillow, Inc. infringe at least claim 1 of the '904 patent through the Zillow Group Media service in at least a similar manner to that shown in the Exhibit 65 claim chart:

AD SPECIFICATIONS	
<b>EXECUTION</b>	Client provides image/logo, copy for header and sub-header Client provides click through URL and tracking
<b>IMAGE / LOGO</b>	1.) Rectangular image: 828px width x 372px height (image will be scaled down but this asset is 2x larger to accommodate Retina displays) max file size 100k; image must not contain a logo or copy; clear, crisp, beautiful images work best; supported creative types: jpeg, gif or png 2.) Logo: width of 220px cropped to all edges (logo will be scaled down but this asset is 2x larger to accommodate Retina displays) max file size 50k; supported creative types: gif or png. No white logos as they will not display.
<b>HEADER</b>	Up to 25 characters including spaces* Copy must not include special characters, italicized letters, or be in all capitals
<b>SUBHEADER</b>	Up to 70 characters including spaces* Copy must not include special characters, italicized letters, or be in all capitals
<b>PLATFORMS</b>	Mobile and Desktop search pages (Zillow and Trulia)
<b>LEAD TIME</b>	Assets due: 5 business days prior to launch date
<b>CONTACT US</b>	Please contact <a href="mailto:brandadvertising@zillow.com">brandadvertising@zillow.com</a> with any questions

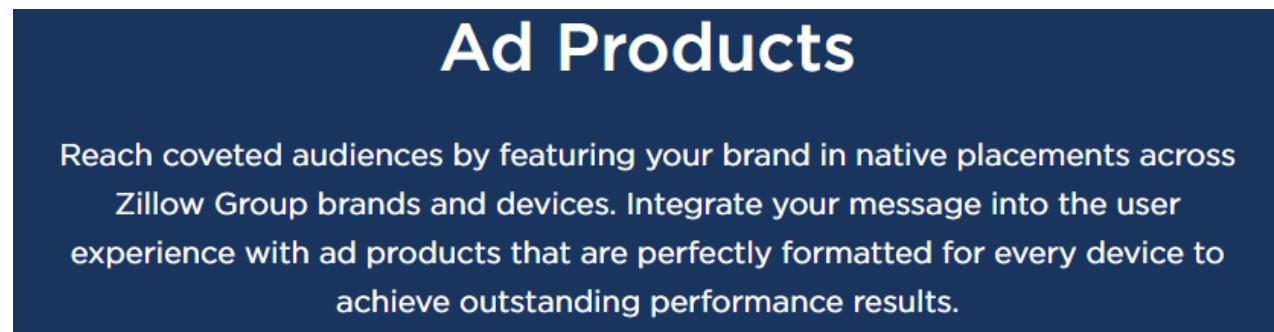
SECOND AMENDED COMPLAINT FOR PATENT  
INFRINGEMENT - 106  
Case No. 2:20-cv-00851-TSZ

LAW OFFICES  
**HARRIGAN LEYH FARMER & THOMSEN LLP**  
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Ex. 66 (<https://www.zillowgroupmedia.com/wp-content/uploads/2019/10/Zillow-Group-Native-Search-Ad.pdf>).

275. For another example, Zillow Group and Zillow, Inc. infringe at least claim 1 of the '904 patent through the Zillow Group Media service in at least a similar manner to that shown in the Exhibit 65 claim chart:



Ex. 47 (<https://www.zillowgroupmedia.com/native-ads/>).

1       276. The Zillow mobile applications, including at least the Zillow Real Estate & Rentals,  
 2 Zillow Rentals, and Zillow Premier Agent applications, infringe at least claim 1 of the '904 patent  
 3 in a similar manner as through the website.

4       277. Alternatively, to the extent that any step of claim 1 of the '904 patent, including the  
 5 "receiving" step, is performed by a third party (in addition to and/or separate from Zillow's  
 6 performance), such as a user, browser, or mobile operating system, that performance is attributable  
 7 to Zillow, Inc. and Zillow Group at least because each Zillow entity has an agency and/or contractual  
 8 relationship with said third party and each Zillow entity controls and/or directs the performance of  
 9 said third party. For example, each Zillow entity controls and/or directs the performance of the  
 10 "receiving" step by users, browsers, and mobile operating systems because it, for example,  
 11 conditions receipt of a benefit, such as improved quality of search results, on the performance of the  
 12 claimed steps, and establishes the manner or timing of the performance by, for example, determining  
 13 which search results will be returned to the user. For another example, each Zillow entity controls  
 14 and/or directs the performance of the "receiving" step by users, browsers, and mobile operating  
 15 systems because it profits from the performance by, for example, increasing use and user interactions  
 16 from improved search results, and each Zillow entity has the right to stop or limit infringement, by,  
 17 for example, using a different method to return search results to a user.

18       278. Alternatively, to the extent any step of claim 1 of the '904 patent, including the  
 19 "receiving" step, is performed by a third party (in addition to and/or separate from Zillow's  
 20 performance), such as a Content Delivery Network ("CDN") or other server, including Amazon  
 21 CloudFront, that performance is attributable to Zillow, Inc. and Zillow Group at least because each  
 22 Zillow entity has an agency and/or contractual relationship with said third party and each Zillow  
 23 entity controls and/or directs the performance of said third party. For example, each Zillow entity  
 24 controls and/or directs the performance of the "receiving" step by CDNs because it, for example,  
 25 conditions receipt of a benefit, such as payment for services, on the performance of the claimed

1 steps, and establishes the manner or timing of the performance by, for example, determining which  
 2 search results will be returned to the user. For another example, each Zillow entity controls and/or  
 3 directs the performance of the “receiving” step by CDNs because it profits from the performance by,  
 4 for example, increasing use and user interactions from improved search results, and each Zillow  
 5 entity has the right to stop or limit infringement, by, for example, using a different method to return  
 6 search results to a user.

7 279. Zillow Group and Zillow, Inc. have had knowledge of the '904 patent and its alleged  
 8 direct and indirect infringement since August 26, 2019.

9 280. Zillow Group and Zillow, Inc. also indirectly infringe one or more claims of the '904  
 10 patent through the Zillow website, including at least [www.zillow.com](http://www.zillow.com),  
 11 [www.zillowgroupmedia.com](http://www.zillowgroupmedia.com), and subdomains thereof, and the Zillow mobile applications. On  
 12 information and belief, in certain circumstances, client devices and software (e.g., devices and  
 13 software used by end users and customers of Zillow's website and the associated mobile  
 14 applications) directly infringe the '904 patent through the use of the website and mobile applications  
 15 to view at least real estate listings. Zillow Group's Annual Report lists \$1,333,554,000 of revenue  
 16 from its website and mobile applications which “generate revenue from the sale of advertising  
 17 services and our suite of marketing software and technology solutions.”<sup>44</sup> The revenue indicates that  
 18 numerous end users and customers used Zillow's website and the associated mobile applications in  
 19 order to view real estate listings and thereby infringe the '904 patent. In particular, to the extent  
 20 Zillow does not perform the method steps, in certain circumstances, client devices and software (e.g.,  
 21 devices and software used by end users and customers of Zillow's website and the associated mobile  
 22 applications) perform at least the method of producing a promotion list recited by claim 1 of the '904  
 23 patent as shown in Exhibit 65.

24

25

<sup>44</sup> Ex. 4 (Zillow Group 2018 10-K) at 3, 42.

1       281. On information and belief, despite knowledge of the infringement of the '904 patent,  
 2 Zillow Group and Zillow, Inc. have intended and continue to intend to contribute to patent  
 3 infringement by third parties by selling, offering to sell, and/or supplying components, and/or a  
 4 material or apparatus for use in practicing the patented methods of the '904 patent by at least end  
 5 users and consumers, as described in this section.

6       282. For example Zillow Group and Zillow Inc. provide computer code underlying the  
 7 Zillow website and mobile applications, such as HTML, JavaScript, and image files, to customers  
 8 and end users for use in infringing the '904 patent and such computer code does not have substantial  
 9 non-infringing uses. Such computer code is especially made and/or especially adapted for use in  
 10 infringing the '904 patent and is not a staple article or commodity of commerce suitable for  
 11 substantial non-infringing use. The only substantial use of Zillow's computer code responses is for  
 12 the claimed subject matter involving returning a promotion list as described in the '904 patent.

13       283. Further, on information and belief, as a part of providing said computer code, Zillow  
 14 Group and Zillow, Inc. enter into binding contracts with end users and customers to use Zillow's  
 15 website and mobile applications, including in an infringing manner including by binding the users  
 16 to a terms of use for the accused website and mobile applications. On information and belief, Zillow  
 17 Group and Zillow, Inc. receive valuable consideration from customers and end users located in this  
 18 judicial district, including information provided by customers and end users, and/or information  
 19 automatically collected from customers and end users. When customers and end users in this judicial  
 20 district use the accused website and/or mobile applications, Zillow Group and Zillow, Inc. collect  
 21 information about the customers and end users, their devices, and their interaction with the accused  
 22 website and the associated mobile applications. Zillow Group and Zillow, Inc. work with service  
 23 providers and advertising networks to track and manage cookie information and activities of  
 24 customers and end users across different websites and devices. Third parties use cookie information  
 25 collected by Zillow Group and Zillow, Inc. to deliver advertisements to end users and customers

1 based on their use of the accused website and mobile applications. Zillow Group and Zillow, Inc.'s  
 2 business is primarily funded through advertising. The applications and website are especially made  
 3 and/or especially adapted for use in infringing the Patents-in-Suit, at least as detailed in the individual  
 4 Counts above, and are not a staple article or commodity of commerce suitable for substantial non-  
 5 infringing uses because, among other things, the components sent to users are uniquely designed  
 6 only to access the infringing aspects of Zillow's website and mobile applications.

7 284. On information and belief, despite their knowledge of the infringement of the '904  
 8 patent, Zillow Group and Zillow, Inc. have intended and continue to intend to induce patent  
 9 infringement by third parties, including at least the direct infringement by end users and customer,  
 10 as described in this section. Zillow has and continues to encourage and instruct customers and end  
 11 users to use Zillow's website and the associated mobile applications in a manner that infringes the  
 12 '904 patent by advertising the website and mobile applications, providing customer support, and  
 13 designing their website and mobile applications in such a way that the use of the website and mobile  
 14 applications by an end user or customer infringes the '904 patent.

15 285. For example, Zillow has encouraged and continues to encourage and instruct  
 16 customers and end users to use Zillow's website and the associated mobile applications in an  
 17 infringing manner by providing customer support and designing their website and mobile  
 18 applications in such a way that the use of the website and mobile applications by an end user or  
 19 customer infringes the Patents-in-Suit. For example, on information and belief, Zillow's customer  
 20 service encourages and supports customers and end users in their use of Zillow's website and the  
 21 associated mobile applications in an infringing manner. For another example,  
 22 <https://zillow.zendesk.com/hc/en-us> provides direction and support for Zillow's website. On  
 23 information and belief, to the extent Zillow was not aware that they were encouraging their  
 24 customers and end users to infringe the '904 patent, its lack of knowledge was based on being  
 25 willfully blind to the possibility that their acts would cause infringement.

1        286. IBM has been damaged by the infringement of its '904 patent by Zillow and will  
2 continue to be damaged by such infringement. IBM is entitled to recover from Zillow the damages  
3 sustained by IBM as a result of Zillow's wrongful acts.

4        287. The infringement by Zillow of the '904 patent was, and continues to be, deliberate  
5 and willful, entitling IBM to increased damages under 35 U.S.C. § 284 and to attorney fees and costs  
6 incurred in prosecuting this action under 35 U.S.C. § 285. In committing these acts of infringement,  
7 Zillow actually knew or should have known that its actions constituted an unjustifiably high risk of  
8 infringement of a valid and enforceable patent.

9       288. IBM has suffered and continues to suffer irreparable harm, for which there is no  
10      adequate remedy at law, and will continue to do so unless Zillow is enjoined therefrom by this Court.  
11      In committing these acts of infringement, Zillow actually knew or should have known that their  
12      actions constituted an unjustifiably high risk of infringement of a valid and enforceable patent.

13        289. Zillow alleges that it does not infringe the claims of the '904 patent because the patent  
14 claims a specific way of solving a technical problem that Zillow alleges it does not perform through  
15 its website and/or mobile applications. *See Exhibit 95, Appendix 5.* Although IBM disagrees with  
16 Zillow's contentions, those contentions demonstrate that Zillow agrees that the invention of the '904  
17 patent teaches a particular way to solve a specific technical problem.

## **RELIEF REQUESTED**

19 Wherefore, IBM respectfully requests that this Court enter judgment against the Defendants  
20 as follows:

21 A. That the '849 patent has been and continues to be infringed by Defendants;

22 B. That Defendants' infringement of the '849 patent has been willful;

23 C. An injunction against further infringement of the '849 patent;

24 D. That the '346 patent has been and continues to be infringed by Defendants;

25 E. That Defendants' infringement of the '346 patent has been willful;

1 F. An injunction against further infringement of the '346 patent;

2 G. That the '183 patent has been and continues to be infringed by Defendants;

3 H. That Defendants' infringement of the '183 patent has been willful;

4 I. An injunction against further infringement of the '183 patent;

5 J. That the '789 patent has been and continues to be infringed by Defendants;

6 K. That Defendants' infringement of the '789 patent has been willful;

7 L. An injunction against further infringement of the '789 patent;

8 M. That the '389 patent has been and continues to be infringed by Defendants;

9 N. That Defendants' infringement of the '389 patent has been willful;

10 O. An injunction against further infringement of the '389 patent;

11 P. That the '443 patent has been and continues to be infringed by Defendants;

12 Q. That Defendants' infringement of the '443 patent has been willful;

13 R. An injunction against further infringement of the '443 patent;

14 S. That the '904 patent has been and continues to be infringed by Defendants;

15 T. That Defendants' infringement of the '904 patent has been willful;

16 U. An injunction against further infringement of the '904 patent;

17 V. An award of damages adequate to compensate IBM for the patent infringement that has  
18 occurred pre-verdict and for damages that occur post-verdict, together with pre-judgment interest  
19 and costs;

20 W. An award of all other damages permitted by 35 U.S.C. § 284, including increased  
21 damages up to three times the amount of compensatory damages found;

22 X. That this is an exceptional case and an award to IBM of its costs and reasonable  
23 attorneys' fees incurred in this action as provided by 35 U.S.C. § 285; and

24 Y. Such other relief as this Court deems just and proper.

25

